THE ROLE OF PERCEIVED POWERLESSNESS IN SEXUAL RISK TAKING AMONG URBAN YOUTH

by
Sahnah Lim

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DISSERTATION ABSTRACT

Background: Sexually transmitted infections (STIs) disproportionately affect youth and especially those who are socially disadvantaged. Generalized perceived powerlessness (PP) is an underexplored psychosocial construct that may influence sexual risk behaviors among youth. However, there are a dearth of studies that employ demographically diverse, longitudinal samples through the use of appropriate statistical methods.

Objectives: We first aimed to validate a novel PP scale through psychometric testing. We then sought to determine whether PP predicts a range of sexual risk behaviors among youth and assessed for mediating and moderating effects in this relationship.

Methods: This thesis was based on secondary analysis of a longitudinal random household sample of youth (ages 16 to 25) residing in Baltimore, MD. We conducted exploratory and confirmatory factor analyses to assess the scale's psychometric properties and to determine the scale's invariance across gender, race, and SES. We used multiple logistic regression to determine whether PP predicted four sexual risk behaviors (i.e., multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency). Finally, we used structural equation modeling (SEM) and multi-group SEM to determine mediating and moderating factors in the longitudinal relationship between PP and sexual risk behaviors.

Results: The PP scale was found to be valid and reliable. Results of factor analyses indicated that the scale was multidimensional on the first order and unidimensional on the second order. Results of multiple logistic regression showed that PP at baseline

predicted sexual risk behaviors at six-month follow-up: multiple partners (aOR: 2.13, p=0.019), condomless sex at last sex (aOR: 1.70, p=0.049), and inconsistent condom use (aOR: 1.76, p=0.042). Results of SEM demonstrated that the need for sexual validation mediated the relationship between PP and condomless sex among black youth (indirect effect: β=0.246; p=0.052) and concurrency among white youth (indirect effect: β=0.189; p=0.044). The mediated relationship from PP to the need for sexual validation to concurrency among white youth was moderated by SES.

Conclusions: Generalized PP is an important distal, psychosocial driver that influences sexual risk among urban youth. Future research should continue to assess for mediating and moderating effects for development of tailored STI interventions for youth.

Thesis advisors: Terrinieka Powell, PhD, MA, and Susan Sherman, PhD, MPH

THESIS READERS AND FINAL ORAL EXAMINATION COMMITTEE

Committee Members

Terrinieka Powell, PhD, MA

Assistant Professor, Academic Advisor

Department of Population, Family and Reproductive Health

Susan Sherman, PhD, MPH

Professor, Chair of Committee

Department of Health, Behavior and Society

Michele Decker, ScD, MPH

Associate Professor

Department of Population, Family and Reproductive Health

Elizabeth Colantuoni, PhD, ScM

Associate Scientist

Department of Biostatistics

Alternate Committee Members

Kristin Mmari, DrPH, MA

Associate Professor

Department of Population, Family and Reproductive Health

Deanna Kerrigan, PhD, MPH

Associate Professor

Department of Health, Behavior and Society

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1. INTRODUCTION

1.1. Sexually Transmitted Infections (STIs) among Youth in the U.S.

Adolescence and young adulthood are important developmental periods during which identities and behaviors are formed. The values, personal characteristics, and behaviors that are cultivated during this period set the foundation for subsequent health trajectories.[1,2] Identity formation also involves the development of sexual identity, which many youth realize through initiation of sex or sexual experimentation. As a result, STI rates are elevated among youth compared to adults.[3] Data from 2008 showed that nearly 50% of STI incidence occurred among individuals aged 15 to 24 years despite the fact that they represent 25% of the sexually active population.[4] Most recent data from the 2015 Youth Risk Behavioral Surveillance indicate that certain sexual risk behaviors have declined over time (e.g., condomless sex at last sex and multiple partners).[5] However, these behaviors remain prevalent and youth continue to face barriers to accessing quality STI prevention and care including inability to pay, lack of insurance, lack of transportation, clinic hours that do not accommodate school schedules, invasive methods of specimen collection, and concerns about confidentiality.[6]

The STI epidemic is also characterized by substantial and persistent gender, racial, and socioeconomic disparities, including among youth. Both total prevalence and incidence of the eight most common STIs were higher among women compared to men in 2008.[4] Fifteen to nineteen year old black female youth had over five times the rate of chlamydia infections compared to their white counterparts (1,458.3 per 100,000 females) in 2012.[7] A nationwide U.S. study with youth found that the poorest quintile was at 83% higher odds of STI (i.e., Chlamydia, Gonorrhea or Trichomoniasis)

diagnosis when compared to the richest quintile.[8]

Public health interventions to address the STI epidemic could potentially have a higher impact on youth compared to adults whose values and behaviors are more intransigent. However, intervention efforts to reduce STI burden and disparities among youth have often focused on individual-level factors.[8] Interventions are often narrow in scope and only target sexual risk without taking into account psychosocial drivers of sexual risk behaviors.[9] Interventions that include broader-based content (e.g., goal-setting, decision-making skills) and target more than just individual-level factors are needed for sustained and holistic reduction of sexual risk.[9] In order to effectively inform such interventions, there is a continuing need to explore additional psychosocial determinants of sexual risk among youth.

1.2. Racial, Gender, and Socioeconomic Disparities in STIs

Racial, gender, and socioeconomic disparities in health outcomes are well-established in various domains of health in the U.S.[10,11] A complex web of social hierarchies create unequal distribution in resources and in power, with serious consequences for health among those with low social status.[11] Power is defined as the ability to act upon an outcome or the capacity to influence the action of others.[12] An individual or group's level of power influences all domains of life, including health. Those who lack power face greater levels of vulnerability to ill health as well as increased consequences of ill health.[11] STI disparities, like that of other health outcomes, are fundamentally influenced by disparities in access to resources and power. Disentangling the mechanisms by which such inequities in resources and power shape disparities in STIs, however, has proved challenging.

1.2.1. Racial Disparities

There are a range of factors operating at different levels that account for some of the racial, gender, and socioeconomic disparities in STIs in the U.S.[13] Neighborhood-level factors such as concentrated poverty,[14-16] high unemployment,[15] residential segregation,[17] and elevated proportion of female headed households[15] have shown to account for increased sexual risk behaviors among black individuals. Studies have demonstrated that family-level factors (e.g., family attachment, support, and parental mentoring)[18,19] as well as peer-level factors (e.g.. peer norms) also contribute to differences in sexual risk behavior by race.[20,21] At the individual-level, black youth have higher rates of sexual risk behavior, including concurrency,[22,23] earlier age of sexual debut,[17,18,24] and multiple partners[19,25] compared to white youth.

1.2.2. Gender Disparities

Gender disparities in STIs, similarly, are determined and continuously shaped by women's relative low social status compared to men.[26,27] At the partner-level, women have been shown to have high risk sexual partners (e.g., STI infected partner), placing them higher risk of STIs.[28] Another important partner-level factor relates to the unequal power dynamics in romantic and sexual relationships that hinder women's ability to negotiate condom use and other safe sex behaviors.[12,29,30] At the individual-level, women report higher levels of certain sexual risk behaviors compared to men, including inconsistent condom use and sex exchange.[31] Girls and women are at higher risk of gender-based violence and mental health disorders (e.g., post-traumatic stress disorder and depression), which in turn has shown to increase risk of STIs.[32-39]

1.2.3. Socioeconomic Disparities

Studies have demonstrated the link between neighborhood-level poverty, decreased collective efficacy (at the neighborhood-level), and increased sexual risk taking.[16] Other neighborhood-level factors include community norms that discourage marriage and long-term romantic partnerships due to diminished economic opportunities, leading to increased levels of concurrency.[40] Inequalities in socioeconomic status (SES) between sexual partners are associated with decreased communication about male condom use and STI prevention, resulting in increased STI risk for both partners.[41] At the individual-level, poverty has been a driver of sex exchange for both men and women.[31] Low SES can also increase intensity of adherence to gender attitudes and ultimately sexual risk taking.[42-44] As a way to cope with lack of economic power and to regain a sense of self-respect, low SES men may search for new ways of defining their masculinity (e.g., physical and sexual prowess) at the expense of safe sex behaviors.[44,45] Similarly, women who perceive lower socioeconomic opportunities are more likely to adhere to hyperfeminine attitudes that lead to greater acceptance of male partner concurrency.[40,42]

1.2.4. Sexual Network Patterns

Another important factor driving STI disparities and one that highlights how multiple social identities may interact is sexual network patterns. Black individuals participate in sexual networks that are characterized by a high prevalence of infection, assortative mixing by race, and disassortative mixing by risk. This mixing pattern results in increased spread of STIs among black individuals, even when coupled with low levels of sexual risk behaviors.[46,47] As a result, black women are at higher risk of STIs despite

reporting lower levels of certain sexual risk behaviors than white women. In sum, there are a multitude of factors operating at various levels that contribute to demographic disparities in STIs in complex ways. Despite the research on the potential drivers of STI disparities, differences by race, gender and SES remain significant and persistent.

1.3. Perceived Powerlessness

1.3.1. Definition and Determinants of Perceived Powerlessness

Social Cognitive Theory (SCT) asserts that motivations and behaviors derive from the core belief that one has the power or control to produce desired changes by one's actions.[48] An underexplored, but potentially critical psychosocial construct that may influence sexual risk taking and disparities in STIs among youth is perceived powerlessness. We broadly define perceived powerlessness as "the belief that one can[not] determine or control one's own internal states and behavior, influence one's environment, and/or bring about desired outcomes."[49] In constrast, individuals with high perceived power possess a strong sense of control; they believe that their social world is responsive to their choices, actions, and efforts.[50]

Perceived powerlessness both directly and indirectly influences behavior. Indirectly, perceived powerlessness influences knowledge, outcome expectations, perceived facilitators, and perceived impediments.[48] Individuals with high perceived powerlessness set lower goals, exhibit lower persistence in engaging in a behavior, avoid behaviors that hold negative outcome expectancies, and perceive barriers to be insurmountable.[48] Perceived powerlessness is considered a state, rather than an enduring trait, and thus, an aspect of an individual that is modifiable.[51,52]

Perceived powerlessness can be either generalized without reference to a specific

health behavior or it can be behavior-specific. The generalized form of the construct is more distal and an example item is "sometimes I feel that I am being pushed around in life." In contrast, behavior-specific powerlessness is more proximal and examples include powerlessness in weight control,[53] coping with cancer,[54] and sexual risk reduction.[55-57] This thesis was interested in the generalized form of the construct.

Perceived powerlessness is often determined by structural factors that are intimately linked to individuals' social position, including their race, gender, and SES.[58-63] Perceived powerlessness acts as the primary link – a "cognitive bridge" -- between low social status and well-being.[52] Restrictions in access to resources and power results in a profound sense or perception that one cannot control behaviors or outcomes.[50,64] For example, racial discrimination throughout the life course has been shown to produce profound feelings of powerlessness.[44,65,66] Fewer studies have focused on how gender impacts perceptions of powerlessness, but nonetheless, scholars have demonstrated that women generally have higher levels of perceived powerlessness than men.[67-70] Neighborhood disorder, characterized by high rates of poverty, crime, and weak ties with neighbors, has also been shown to result in feelings of powerlessness.[52,63,71,72] Although perceived powerlessness is an individual-level psychosocial construct, these distal, social determinants of perceived powerlessness are equally important for effecting behavior change. Some scholars have created an artificial dichotomy between social and individual causes of disease,[48] which may unnecessarily undermine research involving individual-level factors.

Power is a broad concept that influences numerous domains (e.g., social, political, romantic, health, etc.) and is used in a wide range of fields, including

psychology, sociology, education, and public health. As a result, there continues to be a lack of measurement clarity in the perceived powerlessness construct.[53,67,68] Some scholars argue that the construct is comprised of multiple dimensions; an example of a multidimensional conceptualization includes powerlessness over internal states and behaviors versus powerlessness over external events.[49] Many studies, however, assume that perceived powerlessness is unidimensional without formal assessment via psychometric testing.[73-75] Clear establishment of dimensionality, or factor structure, is essential for a construct's appropriate scoring, evaluation, and interpretation.[60,76] If multidimensional, the dimensions should be used separately rather than the scale as a whole.[77]

Despite disagreement on the psychometric properties of the construct, scholars agree on the centrality of perceived powerlessness in determining the well-being of individuals.[52,58,78] Perceived powerlessness is a psychosocial construct that may be especially relevant for youth since they have higher levels of perceived powerlessness when compared to adults.[52,79] As youth become older, they gain autonomy and socioeconomic standing, thereby increasing their sense of control.[79] Therefore, levels and trajectory of perceived powerlessness are uniquely different for youth compared to adults, meriting exploration of how perceived powerlessness may influence health behaviors among youth.

1.3.2. The Relationship between Perceived Powerlessness and Health Outcomes

There is an extensive body of literature establishing the relationship between perceived powerlessness and non-sexual health outcomes. Specifically, feeling powerless has been linked to adverse health outcomes such as obesity,[80] lower

medication adherence and self-care,[81] depression,[63,66,67,82,83] decreased health-seeking behavior,[68,84,85] and mortality.[86] Perceived powerlessness has also been shown to drive sexual risk behaviors (e.g., condomless sex).[18,87,88] However, the majority of studies looking at sexual risk behaviors among young people employ a behavior-specific form of perceived powerlessness (e.g., powerlessness in sexual communication,[89] condom negotiation,[89-91] and sexual risk reduction[55-57]) rather than the generalized form.

Correspondingly, many STI interventions focus on increasing a sense of control and power in the context of sexual or romantic relationships, but not in a more generalized manner.[92-95] While addressing behavior-specific perceived powerlessness remains important in reducing sexual risk behavior, we believe that there may be greater advantages for researching and targeting the generalized construct. First, interventions focusing on the generalized and more distal construct may be more effective in preventing a wider range of sexual risk behaviors (e.g., targeting powerlessness in condom negotiation may improve condom use but not a reduction in concurrency or multiple partners). Second, interventions targeting the generalized construct can better address the more distal, root causes of sexual risk, thereby increasing both the short and long-term efficacy of interventions when compared to addressing behavior-specific perceived powerlessness alone.

A small number of studies have examined the relationship between generalized perceived powerlessness and sexual risk behavior among youth. Most of these studies were cross-sectional in design and found that generalized perceived powerlessness was associated with age of onset of sexual intercourse,[96,97] condomless sex,[97,98] and inconsistent condom use.[87,99] Only two studies used longitudinal samples and the authors

found that perceived powerlessness predicted age of onset of sexual intercourse[18] and condomless sex.[88] One of the studies suffered from significant attrition (62.5%) and the other study employed a single-item to assess perceived powerlessness.[18,88] In short, there is a need for additional research employing robust longitudinal designs and a validated, multi-item perceived powerlessness construct to predict sexual risk behaviors among youth.

1.4. The Need for Sexual Validation

To our knowledge, there are no studies that look at mechanisms by which perceived powerlessness predicts sexual risk behavior among youth. Social Cognitive Theory delineates that one of the mechanisms by which perceived powerlessness affects behavior is through "outcome expectations," which is defined as the social approval of behaviors as well as the self-satisfaction or self-worth one derives from performing a behavior.[48] The need for sexual validation is one potential mediator that conceptually corresponds with outcome expectations and one we propose as a mediator in the relationship of perceived powerlessness and sexual risk behaviors. The need for sexual validation is defined as the sense of validation an individual feels about him or herself (perceived self- validation) as well as the validation an individual perceives from peers (perceived peer validation) with regards to sex and sexual relationships. Peer validation corresponds with Social Cognitive Theory's "social approval" component while self-validation corresponds with the theory's "self-satisfaction/self-worth" component.

To the best of our knowledge, the relationship between the need for sexual validation and perceived powerlessness or sexual risk behaviors has not been examined. A similar concept exists in the HIV/STI literature – sexual prowess. Sexual prowess is a

concept that Tony Whitehead put forward in an effort to explain how hypermasculinity among black men increases sexual risk taking. Whitehead theorized that gender identity is comprised of three main components: economic, sociopolitical, and sexual.[44] Confronted with systematic denial of economic and political power, black men attempt to regain control in the one domain they feel is attainable – physical and sexual prowess (i.e., hypermasculinity).[44,45] Stronger adherence to hypermasculinity has shown to be associated with increased sexual risk behaviors such as concurrency and condomless sex among black male youth.[41,42] The need for sexual validation is distinctly different from sexual prowess, however, since it is conceptualized more broadly and not strictly in relation to gender identities or exclusively for a particular group. That is, the need for sexual validtion is a concept that is relevant for both genders and not specific to a particular race.

1.5. Conceptual Framework and Hypotheses

The three specific aims of the following thesis are:

> **AIM 1** Assess the validity and reliability of the perceived powerlessness scale measured among youth in Baltimore, MD (N = 350).
>
> **AIM 2.1** Determine whether perceived powerlessness predicts a range of sexual risk behaviors and,
> **AIM 2.2** Determine whether sub-domains of perceived powerlessness uniquely predict a range of sexual risk behaviors among youth in Baltimore, MD (N =257).
>
> **AIM 3.1** Determine whether the relationship between perceived powerlessness and sexual risk behaviors is mediated by the need for sexual validation, and,
> **AIM 3.2** Determine whether this mediated relationship is moderated by SES and gender among youth in Baltimore, MD (N = 257).

Figure 1.1. illustrates the conceptual framework for this thesis. While we are ultimately interested in how sexual risk behaviors drive STIs, STI acquisition (in dashed borders)

was not measured as part of the study. We examined four sexual risk behaviors in Aims 2 and 3: multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency.

[Figure 1.1. here]

First, in order to evaluate the validity and reliability of the perceived powerlessness scale, we conducted explanatory factor analysis (EFA) using baseline data (Aim 1). Based on the results of EFA, we conducted Confirmatory Factor Analysis (CFA) on the perceived powerlessness scale using both baseline and follow-up data. Lastly, we conducted a multi-group CFA using baseline data in order to test for measurement invariance across key demographic factors, including gender, race, and SES. The three sub-domains (i.e., present, future, and financial perceived powerlessness) that were determined through EFA and CFA were later used in Aim 2. We also took into consideration the results of the invariance testing (i.e., non-invariance by race) during analyses for Aim 3 and we applied the measurement models derived from this aim to Aim 3.

Second, we determined whether perceived powerlessness predicted four sexual risk behaviors (i.e., multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency) using multiple logistic regression (Aim 2.1). In addition, we determined whether the three sub-domains of perceived powerlessness uniquely predicted these same four sexual risk behaviors (Aim 2.2). As previously mentioned, there are dearth of studies employing longitudinal data and a validated, generalized perceived powerlessness measure to predict sexual risk among youth. Two of the sexual risk behaviors we examined, multiple partners and conucrrency, have not been

previously explored in relation to perceived powerlessness. We hypothesized that greater perceived powerlessness would predict increased sexual risk behaviors.

Third, we determined whether the relationship between perceived powerlessness and sexual risk behaviors was mediated by the need for sexual validation through structural equation modeling (SEM) (Aim 3.1). To our knowledge, our study was the first to explore mediators in the relationship between perceived powerlessness and sexual risk behaviors. We a-priori stratified our analyses by race based on earlier measurement invariance testing on perceived powerlessness and need for sexual validation scales that indicated measurement non-invariance by race. We hypothesized that higher perceived powerlessness would predict a higher need for sexual validation, which in turn would predict increased sexual risk behaviors.

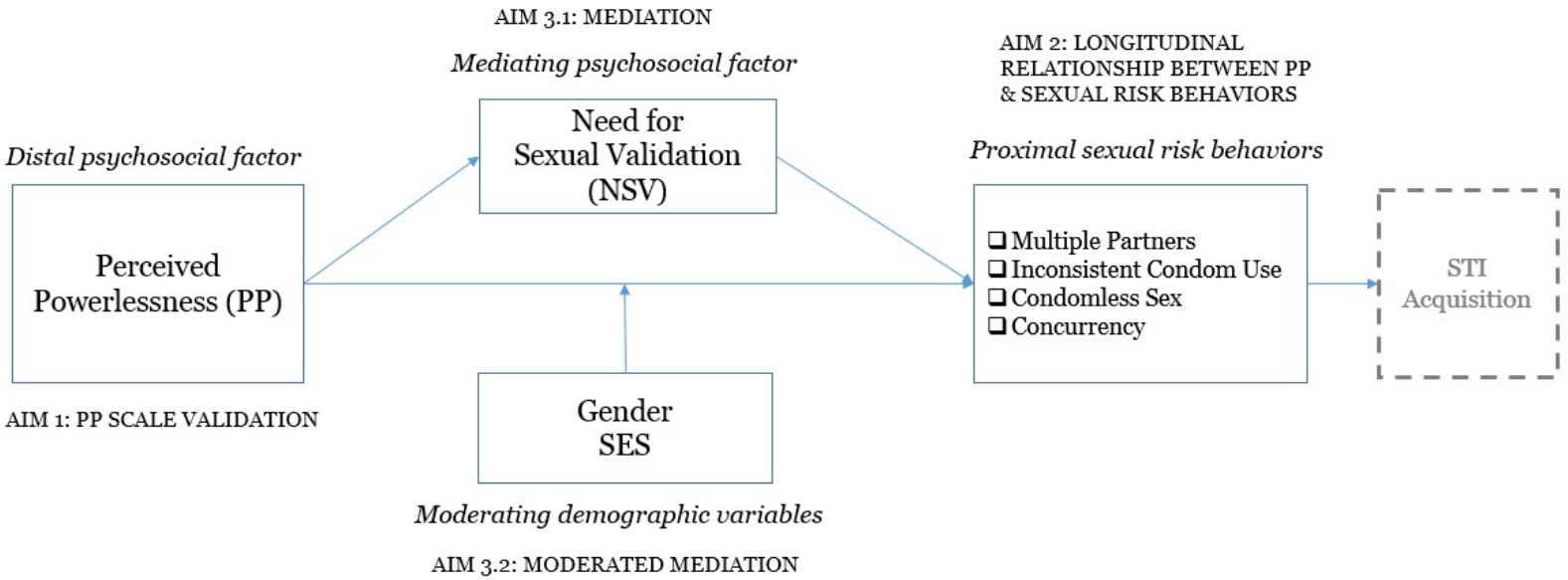
Once significant mediation was established between perceived powerlessness and two of the sexual risk behaviors (i.e., concurrency among white youth and condomless sex at last sex among black youth), we determined whether these mediated relationships were moderated by SES and gender through multi-group SEM (Aim 3.2). Because levels of perceived powerlessness and sexual risk behaviors are influenced and differ by social identities, we aimed to determine whether this main relationship of interest would differ by SES and gender. We hypothesized that the mediated effect of perceived powerlessness to sexual risk behavior would be stronger among low SES and among female individuals compared to high SES and male individuals, respectively. It must be noted that our original aim was to also assess for moderation by race; because we had found measurement non-invariance by race, we were not able to test a moderation hypothesis based on race.

1.6. Summary of Chapters

Chapter Two describes the study population and setting, measures, and analyses for each of the aims. Chapters Three, Four, and Five present three stand-alone manuscripts, all of which include a separate introduction, methods, results, and discussion sections. Chapter Three is the first manuscript in the series and is a measurement paper that assessed the reliability and validity of the perceived powerlessness scale via psychometric testing. Chapter Four is the second manuscript and aimed to determine whether perceived powerlessness predicts a range of sexual risk behaviors. We used multiple logistic regression for the analyses for this manuscript. Exploring the association between perceived powerlessness and sexual risk behaviors was an important preliminary step prior to determining mediation in the third manuscript. Building on results of the first manuscript, we also determined whether the three sub-domains of perceived powerlessness uniquely predicted a range of sexual risk behaviors. Chapter Five presents the third and final manuscript detailing the results of mediation and moderated mediation analyses using structural equation modeling. Chapter Six summarizes and expands upon the findings of the three manuscripts and ends with a conclusion.

1.7. Figures

Figure 1.1. Conceptual Framework



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2. METHODS

2.1. Study Population and Setting

This thesis was based on secondary analysis from data from a NICHD-funded study, "The Relationship of Ethnicity, Class, and Gender Ideologies with STI Risk Behaviors Among Adolescents in Baltimore, Maryland" (R01HD057789; PI: Susan Sherman). The parent study's primary aim is to examine the relationship between social position (gender, SES, race) and gender roles in predicting partner selection patterns and sexual risk behaviors. The study is a longitudinal household study of youth aged 16 to 25 years old. Data were collected from February 2011 through May 2013 and yielded a baseline sample of 350 participants and a six-month follow-up sample of 257. To ensure comparability of baseline versus follow-up samples, we compared key demographic factors, perceived powerlessness scores, and sexual risk behaviors over time and did not find any statistically significant differences.

Details of study methods have been described elsewhere.[1] Briefly, investigators employed a stratified sampling design by census block groups (CBG) to allow for oversampling in areas with high concentrations of the target population. A probability-based sample of residential mailing addresses were then generated within each CBG. Of the 12,000 households that were sent letters, 10,509 were successfully contacted. Of those who were contacted, 281 household were eligible, and 237 agreed to participate (84%). Participants were eligible if they were black or white, English speaking, sexually active, between the ages of 16 and 25 years old, and residing in Baltimore City.

Parental/guardian informed consent and adolescent informed assent were obtained for individuals younger than 18 years old. Informed consent was obtained for individuals

18 years or older. The study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Consented and enrolled participants were administered an audio computer-assisted self-interview (A-CASI) in a private setting. The A-CASI survey captured information on demographics, various psychosocial variables (e.g., perceived powerlessness, depressive symptoms, and need for sexual validation), and individual- and partner-related sexual risk behaviors.

Table 2.1. displays characteristics of respondents at baseline (N=350), stratified by low versus high perceived powerlessness (dichotomized at the median value of 1.9). The mean age of the sample was 21 years old and the majority of the sample identified as black (65%), female (62%), and heterosexual (79%). Fifty-eight percent of the sample perceived their SES as low. Thirty-eight percent of the sample reported mild to severe depressive symptoms, 21% had ever been arrested, and 70% indicated growing up without a father figure. There were no differences in perceived powerlessness scores by these characteristics with the exception of depressive symptoms (i.e., high powerlessness individuals were more likely to report mild to severe depressive symptoms; $p<0.001$) and lifetime arrest (i.e., high powerlessness individuals were more likely to have been arrested; $p = 0.041$).

[Table 2.1. here]

2.2. Measures

2.2.1. Perceived Powerlessness (PP)

The original 12-item perceived powerlessness scale was developed by the study team to reflect an urban context such as Baltimore, in part characterized by lack of educational and economic opportunities as well as high levels of poverty and violence.[2-4]

The scale included generalized items that have no specific reference to any domain or health behavior and ones that are commonly included in other generalized perceived powerlessness scales. An example of a generalized item from the scale was "When I have a problem, I do not feel confident I can solve it." The scale also included items referencing structural domains that would be salient to the study population: school or job, political participation (i.e., voting), and finances. These structural domain items are typically not included in other perceived powerlessness scales. Even though structural domain items are more specific than the generalized items, they are not considered behavior-specific since they have no reference to a health behavior. An example of an item referencing a structural domain (i.e., school or job) was "Working hard in school or on the job does not guarantee better opportunities later on." The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). All items were reverse coded so that higher scores indicated greater levels of perceived powerlessness.

Through scale validation in Aim 1, we developed a more parsimonious 9-item scale (See Chapter 3 of thesis). This 9-item scale at baseline was subsequently used in Aims 2 and 3. The scale was found to be valid and reliable (α=0.81). Results of psychometric testing in Aim 1 indicated a three factor solution on the first order (i.e., future, present, and money) and a one factor solution on the second order (i.e., perceived powerlessness). The same factor structure was specified for the measurement model in Aim 3 for our structural equation modeling (SEM). Table 2.2. shows the three first order factors (i.e., sub-domains) and corresponding items in the 9-item perceived powerlessness scale.

[Table 2.2. here]

2.2.2. Need for Sexual Validation (NSV)

The original need for sexual validation scale included 12-items and aimed to capture the importance that individuals place on having sex and sexual relationships. To our knowledge, this scale was the first to specifically measure the importance of sex and sexual relationships and one that seeks to elicit the level of validation individuals seek from both themselves as well as from their peers. Scale validation showed that the more parsimonious, 11-item scale was valid and reliable (α=0.90) (See Appendix 5.2.). Results of the exploratory factory analysis (EFA) indicated a one-factor structure and was specified as such in Aim 3 for our structural equation modeling (SEM). The 11-item scale at baseline was used for Aim 3. The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). An example of an item from the need for sexual validation scale was "the more people I am having sex with, the better I feel about myself." All items were reverse coded so that higher scores indicated greater need for sexual validation.

2.2.3. Sexual Risk Behaviors

For Aims 2 and 3, we looked at a total of four recent (past six months) sexual risk behaviors at follow-up: multiple partners (>1 vs. ≤1), inconsistent condom use (always vs. <always during vaginal or anal sex), condomless sex at last sex (yes vs. no condom during vaginal or anal sex), and concurrency (yes vs. no). Concurrency was measured by asking participants whether they had vaginal or anal sex with anyone other than the partner(s) they had listed while they were seeing that partner.

2.2.4. Covariates

There were several demographic variables that we employed for analyses in this thesis, including age (continuous), gender (male vs. female), race (black vs. white), SES (low vs. high), and sexual orientation (heterosexual vs. non-heterosexual, including gay or bi-sexual). For SES, we employed a subjective construct (i.e., perceived SES). Perceived SES was measured using an image of a ladder with ten rungs (values ranging from 1 to 10 with 1 indicating higher perceived SES); participants were asked to place themselves based on where they think they stand in society in terms of money, education, or jobs.[5,6] The scores were then dichotomized as low SES ($\geq$6) versus high SES (< 6). Psychosocial covariates included depressive symptoms (CESD: <16; below clinical threshold vs. ≥16; mild to severe),[7] ever arrested (yes vs. no), and grew up without a dad (yes vs. no).

2.3. Aim 1 Analysis

Aim 1 assessed the validity and reliability of the perceived powerlessness scale. For descriptive purposes only, a summary perceived powerlessness score was created and dichotomized at the median (<1.9: low vs. ≥1.9: high) for ease of interpretation. First, differences in key demographic and psychosocial variables by perceived powerlessness level were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous variables with significance set at $\alpha<0.05$. Descriptive analyses were conducted in STATA, Version 13.[8]

We took an inductive approach to determine how to best conceptualize perceived powerlessness based on the data. Accordingly, we conducted a principal components analysis (PCA) on a polychoric correlation matrix and subsequently EFA on the baseline

data. The number of factors were determined via the following criteria: Eigen values greater than 1.0,[9] percent variance explained, and scree plot.[10] EFA was then conducted using a promax rotation and a maximum likelihood estimator. PCA was performed using Stata 13.[8] Items were considered for dropping if they had high levels of uniqueness (>0.50) or if they did not load highly on one factor (<0.40).[11,12] Once items were dropped, PCA and EFA were re-conducted to ensure that adequate uniqueness values and factor loadings were achieved.

Next, a confirmatory factor analysis (CFA) was conducted on both the baseline and follow-up samples to test the validity of the models proposed by EFA. A weighted least squares mean and variance (WLSMV) estimator was used, as recommended as with categorical indicators whose distribution is not multivariate normal.[13] Adequacy of model fit was assessed using the root-mean-square error of approximation (RMSEA), with values <0.10 as indicating good fit.[14] In addition, the Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) values >0.95 were used to denote good fit.[15] All EFAs and CFAs were performed using MPlus Version 7.[13] Cronbach's alpha reliability coefficient was used to assess the scale's internal consistency.

In order to assess measurement invariance by gender (male vs. female), race (black vs. white) and SES (low vs. high), we performed multiple-group CFA. A constrained model was fit, wherein the loadings and thresholds were set to be equal across groups. We then performed a robust chi-square model difference test using the Mplus DIFFTEST function. Although not explicitly a part of the objectives of this study, we also assessed measurement invariance across time comparing the baseline against the

follow-up sample to ensure that participants were responding to the construct in the same way at two different time points.

2.4. Aim 2 Analysis

Differences in key demographic and psychosocial variables by perceived powerlessness level (low vs. high) were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous variables with significance set at $\alpha<0.05$. Differences in demographic and psychosocial variables by type of sexual risk behavior were also examined via chi-squared tests. We then used multivariate logistic regression to test the relationship between perceived powerlessness at baseline (total score) and each of the sexual risk behaviors at 6 month follow-up, adjusting for theoretically relevant demographic variables (i.e., age, gender, race, and SES) that have shown to be associated with both the predictor and outcome. Additional analyses employed multivariate logistic regression to test the relationship between three of the sub-domains (entered as separate predictors in one model), adjusting for theoretically relevant demographic variables (i.e., age, gender, race, and SES). These analyses tested whether any of the three sub-domains uniquely predicted a sexual risk behavior, above and beyond the two other sub-domains. Because the three sub-domains might be highly correlated, we assessed for multicollinearity of independent variables based on variance of inflation factors (cutoff of <10).[16] There was no evidence for multicollinearity in the regression models (results not shown). All statistical analyses were conducted in STATA, Version 13.[8]

2.5. Aim 3 Analysis

Differences in key demographic and psychosocial variables by race were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous

variables with significance set at $\alpha<0.05$. SEM was employed to determine whether NSV (at baseline) mediated the relationship between PP (at baseline) and sexual risk behaviors (at follow-up). Results of normality testing (results not shown) indicated that the latent variable and their indicators were not multivariate normal. Accordingly, a WLSMV estimator was used.[13] Adequacy of model fit was assessed using RMSEA with values <0.10 as indicating good fit.[14] In addition, TLI and CFI values >0.95 were used to denote good fit.[15] Nested models were compared using a robust chi-square model difference test using the Mplus DIFFTEST function. Bivariate analyses were performed using STATA Version 13,[8] and SEM was performed using MPlus Version 7.[13]

Mediation assessment was guided by Baron and Kenny and involved the comparison of three models: non-mediated model, partially-mediated model, and fully-mediated model (see Figure 2.1.).[17] For each outcome, the non-mediated model assessed the direct effect of PP on outcome, excluding the mediator (i.e., NSV). It must be noted that a statistically significant relationship between PP and the outcome is not required in order to proceed to the next step.[18] The second and partially mediated model included NSV, resulting in three direct effects: PP on outcome, PP on NSV, and NSV on outcome. The fully mediated model excluded the direct effect of the PP on outcome and only included the direct effects of PP on NSV and NSV on outcome.

[Figure 2.1. here]

We can conclude that there is full mediation when the following conditions hold: First, the direct effects (PP on NSV and NSV on outcome) of the partially mediated model is statistically significant *and* the direct effect of PP on outcome is close to zero and not significant; Second, the *p*-value for the chi-square difference testing comparing

the partially mediated to the fully mediated model is not significant; Third, the indirect effect of the PP on outcome via NSV is significant in the fully mediated model.[19] Indirect effects were obtained using the model indirect command in Mplus. Bootstrap standard errors and confidence intervals were also obtained via MPlus; 1,000 bootstrap samples were requested.[13]

To test our moderated mediation hypotheses by gender and SES, we used multi-group SEM. We first fit an unconstrained model in which path coefficients were allowed to vary across groups and then fit a constrained model in which path coefficients were forced to be equal. A non-significant multi-group chi-square value signified that the smaller, constrained model did not fit the data statistically significantly worse, meaning that we did not find evidence to support moderation. Conversely, a significant multi-group chi-square value signified that the path coefficients were in fact different across groups, meaning that we found evidence to support moderation. Moderation was only assessed for models in which there was evidence of statistically significant mediation.

2.6. Weighting

The parent study employed a complex sampling design, in which households were randomly selected within clusters of census block groups and one in which low SES and black households were oversampled. Both Stata and Mplus statistical software packages allow for consideration of complex survey designs via use of sampling weights. However, the proposed study was interested in the direction and strength of relationships taken together (e.g., direct and indirect pathways within an SEM analysis) rather than making population-level inferences. For these reasons, weighting was not incorporated into the analyses. Some of the published manuscripts on the parent study also employed

weights to account for multiple partnerships within an individual (up to six partnerships for each individual within the last six months). The proposed study did not need to account for multiple partnerships because the sexual risk behaviors of interest were summary measures for all partnerships within one individual.

2.7. Tables and Figures

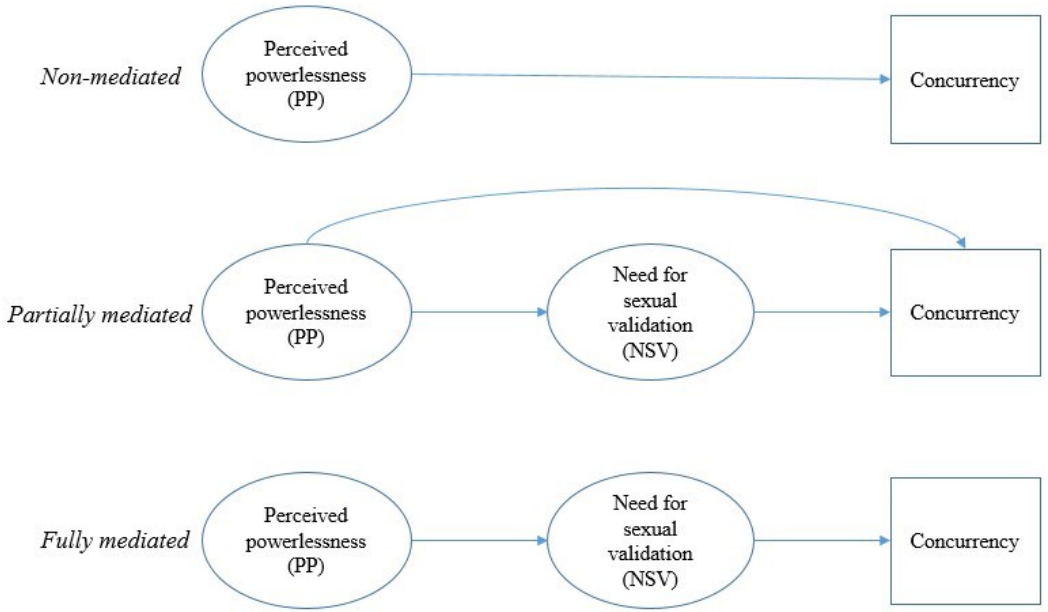
Table 2.1. Participant characteristics by low vs. high perceived powerlessness at baseline (N=350)

	Total		Low powerlessness		High powerlessness		
	n	(%)	n	(%)	n	(%)	*p-value*
Age (Mean, SD)	21.0	(2.6)	21.0	(2.6)	21.0	(2.5)	0.945
Gender							
Female	218	(62.3)	101	(47.0)	114	(53.0)	0.717
Male	132	(37.7)	58	(45.0)	71	(55.0)	
Race							
Black	228	(65.1)	110	(49.1)	114	(50.9)	0.142
White	122	(34.9)	49	(40.8)	71	(59.2)	
SES							
Low	204	(58.1)	88	(43.6)	114	(56.4)	0.152
High	141	(40.9)	71	(51.5)	67	(48.6)	
Sexual orientation							
Heterosexual	259	(78.7)	123	(47.9)	134	(52.1)	0.230
Non-heterosexual	70	(21.3)	27	(39.7)	41	(60.3)	
Depressive symptoms (≥16)	128	(37.9)	35	(27.3)	93	(72.7)	**<0.001**
Ever arrested	75	(21.4)	26	(35.6)	47	(64.4)	**0.041**
Grew up without a dad	243	(70.0)	115	(48.5)	122	(51.5)	0.221

Table 2.2. Item wording in 9-item Perceived Powerlessness Scale

Item (overall scale α= 0.83)	Exploratory Factor Analysis	
	loading	uniqueness
Factor 1: present perceived powerlessness		
pp1. Sometimes I feel that I am being pushed around in life	0.738	0.385
pp2. When I have a problem, I do not feel confident I can solve it	0.845	0.256
pp8. At school or work, I do not always speak up when I have something to say because I do not think anyone will listen to me	0.668	0.339
Factor 2: future perceived powerlessness		
pp7. I do not think that my education has prepared me to achieve a successful career	0.530	0.465
pp9. I do not think much about voting in the future because politicians are not interesting in helping to improve the situation of people like me	0.867	0.358
pp10. There is no point in trying to change things for the better because no one cares or wants to help	0.806	0.272
pp11. Working hard in school or on the job does not guarantee better opportunities later on	0.577	0.552
Factor 3: financial perceived powerlessness		
pp4. I worry about money because jobs for me or my family members are not easy to find or keep	0.900	0.243
pp6. Saving money is hard to do in my household because we already have a hard time paying the bills	0.678	0.426
Deleted items		
pp3. When bad things happen, we are not supposed to know why. We are just supposed to accept them.	N/A	N/A
pp5. People die when it is their time to die, and nothing can change that.	N/A	N/A
pp12. Most people in my life want something better but do not know how to get it.	N/A	N/A

Figure 2.1. Illustration of three models used for mediation analysis with outcome, concurrency



2.8. References

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3. FACTORIAL VALIDITY AND INVARIANCE ASSESSMENT OF THE PERCEIVED POWERLESSNESS SCALE AMONG URBAN YOUTH

3.1. Abstract

Generalized perceived powerlessness is an important psychosocial construct that determines health behavior. The magnitude of feeling powerless varies by an individual's social position. However, the factor structure (i.e., one dimension vs. multiple dimensions) of the perceived powerlessness construct has not been firmly established in the literature. This study had two aims: (1) assess the validity and reliability of a novel perceived powerlessness scale and (2) assess the scale's invariance across key demographic variables (i.e., gender, race, and socioeconomic status (SES)) among a longitudinal sample of urban youth. We used exploratory and confirmatory factor analyses and found that the scale was multi-dimensional on the first order and unidimensional on the second order. The three first order factors were "present" (feeling powerless in the present), "future" (feeling powerless about the future), and "money" (feeling powerless about finances). Results of invariance testing indicated that the scale was invariant across SES and gender, but not race. We put forward interpretations for each factor as well as possible explanations for measurement non-invariance across race. Our study results showed that the perceived powerlessness scale was valid and reliable among a demographically diverse sample of urban youth, showing promise for use in future health behavior and outcome studies.

3.2. Introduction

Power is an overarching concept that can influence many aspects of an individual's life, including political, social, educational, and romantic domains. Social Cognitive Theory articulates that an individual's perception of powerlessness, or conversely of control, plays a central role in determining his or her well-being.[1] The relationship between perceived powerlessness and health outcomes are well established. Specifically, feeling powerless has been linked to adverse health outcomes such as obesity,[2] lower medication adherence and self-care,[3] depression,[4-8] decreased health-seeking behavior,[9-11] and mortality.[12] Less commonly, perceived powerlessness has also been linked to various sexual risk behaviors such as condomless sex.[13-15]

Perceived powerlessness is often an individual's evaluation of the objective conditions of lack of control and power.[16,17] Objective conditions of powerlessness, in turn, is shaped by the individual's social position, including his or her socioeconomic status (SES), race, and gender.[7,18-22] Socially disadvantaged individuals experience systematic restrictions in access to resources and power, which can result in a profound sense that life outcomes are not responsive to their efforts and choices.[23,24] Perceived powerlessness exists on a continuum and can also exist among socially priveleged individuals (or conversely be absent among the disadvantaged), but it is the strength of this belief that varies according to social position.[18,25] Therefore, increasing one's level of perceived power might not only increase engagement in healthy behavior, but it also might reduce health disparities among those who occupy low social status.

There is considerable disagreement on whether perceived powerlessness should refer to powerlessness over behaviors or outcomes, or both.[17] Other scholars have also

argued that powerlessness over internal states and behaviors are substantively different from powerlessness over the external environment.[17] These debates have yielded a lack of theoretical and measurement clarity of perceived powerlessness in the literature.[17,26-28] Thus, it is essential to clearly define and establish the construct's dimensionality (i.e., unidimensional vs. multidimensional) before assessing its association with actual health behaviors and outcomes.[29]

We broadly defined perceived powerlessness as "the belief that one can[not] determine or control one's own internal states and behavior, influence one's environment, and/or bring about desired outcomes."[17] Perceived powerlessness can be either generalized without reference to a specific health behavior or it can be behavior-specific. The generalized form of the construct is more distal and an example item is "sometimes I feel that I am being pushed around in life." In contrast, behavior-specific powerlessness is more proximal and explicitly references a health behavior; examples of behavior-specific powerlessness include powerlessness in weight control,[30] coping with cancer,[31] and sexual risk reduction.[32-34] Our study was interested in the generalized form of perceived powerlessness.

The primary objective of the study is to assess the factorial validity and reliability of a novel generalized perceived powerlessness scale through psychometric testing. The scale differs from other existing scales in the literature as it includes generalized items common in other scales but also incorporates items referencing important structural domains (i.e., school/job, political participation, and finances). These structural domain items are typically not included in other perceived powerlessness scales and was specifically developed for an urban context with restricted opportunities for education

and employment as well as high rates of poverty and violence. Even though structural domain items are more specific than the generalized items, they are still generalized since they do not reference a specific health behavior.

Because perceived powerlessness is influenced by race, gender, and SES, the secondary aim of this study is to assess the scale's invariance across those three demographic variables. This study contributes to the literature through establishment of dimensionality and measurement invariance of a novel perceived powerlessness construct for its future use across different demographic groups in health behavior and outcome studies.

3.3. Methods

3.3.1. Participants and Procedures

The current analysis stems from a longitudinal household study of youth, aged 16-25 years old. Data were collected from February 2011 through May 2013 and yielded a baseline sample of 350 participants and a six-month follow-up sample of 257. Details of study methods have been described elsewhere.[35] Briefly, investigators employed a stratified sampling design by census block groups (CBGs) to allow for oversampling in areas with high concentrations of the target population. A probability-based sample of residential mailing addresses were then generated within each CBG. Participants were eligible if they were black or white, English speaking, sexually active, between the ages of 16 and 25 years old, and residing in Baltimore City. Parental/guardian informed consent and adolescent informed assent were obtained for individuals younger than 18 years old. Informed consent was obtained for individuals 18 years or older.

Of the 12,000 households that were sent letters, 10,509 were successfully

contacted. Of those who were contacted, 281 households were eligible, and 237 agreed to participate (84%). The study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Consented and enrolled participants were administered an audio computer-assisted self-interview (A-CASI) in a private setting. The A-CASI survey captured information on demographics, perceived powerlessness, various psychosocial variables (e.g., social support, gender attitudes, and need for sexual validation), and individual- and partner-related sexual risk behaviors (e.g., condomless sex).

3.3.2. Measures

The original 12-item perceived powerlessness scale was developed by the study team to reflect an urban context such as Baltimore, in part characterized by lack of educational and economic opportunities as well as high levels of poverty and violence.[36-38] The scale included generalized items that have no specific reference to any domain or health behavior and ones that are commonly included in other generalized perceived powerlessness scales. An example of a generalized item from the scale was "When I have a problem, I do not feel confident I can solve it." The scale also included items referencing structural domains that would be salient to the study population: school or job, political participation (i.e., voting), and finances. An example of an item referencing a structural domain (i.e., school or job) was "Working hard in school or on the job does not guarantee better opportunities later on." The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). Items were reverse coded so that higher scores indicated greater perceived powerlessness.

We looked at three demographic variables with which to assess measurement invariance of the perceived powerlessness scale: gender (male vs. female), race (black vs. white), and SES (low vs. high). For SES, we employed a subjective construct (i.e., perceived SES). Perceived SES was measured using an image of a ladder with ten rungs (values ranging from 1 to 10 with 1 indicating higher perceived SES); participants were asked to place themselves based on where they think they stand in society in terms of money, education, or jobs.[39,40] The scores were then dichotomized as low SES ($\geq$6) versus high SES (< 6). For descriptive purposes only, a summary perceived powerlessness score was created and dichotomized at the median (<1.9: low vs. ≥1.9: high) for ease of interpretation. Additional variables for descriptive analyses included sexual orientation (heterosexual vs. non-heterosexual, including gay or bi-sexual), depressive symptoms (CESD: <16 (below clinical threshold) vs. ≥16 (mild to severe)),[41] ever arrested (yes vs. no), and grew up without a dad (yes vs. no).

3.3.3. Data Analysis

Differences in key demographic and psychosocial variables by perceived powerlessness level were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous variables with significance set at $\alpha<0.05$. Descriptive analyses were conducted in STATA, Version 13.[42]

We took an inductive approach to determine how to best conceptualize perceived powerlessness based on the data. Accordingly, we conducted a principal components analysis (PCA) on a polychoric correlation matrix and subsequently exploratory factor analysis (EFA) on the baseline data. The number of factors were determined via the following criteria: Eigen values greater than 1.0,[43] percent variance explained, and scree

plot.[21] EFA was then conducted using promax rotation and a maximum likelihood estimator. PCA was performed using Stata 13.[42] Items were considered for dropping if they had high levels of uniqueness (>0.50) or if they did not load highly on one factor (<0.40).[44,45] Once items were dropped, PCA and EFA were re-conducted to ensure that adequate uniqueness values and factor loadings were achieved.

Next, a confirmatory factor analysis (CFA) was conducted on both the baseline and follow-up samples to test the validity of the models proposed by EFA. A weighted least squares mean and variance (WLSMV) estimator was used, as recommended as with categorical indicators whose distribution is not multivariate normal.[46] Adequacy of model fit was assessed using the root-mean-square error of approximation (RMSEA), with values <0.10 as indicating good fit.[47] In addition, the Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) values >0.95 were used to denote good fit.[48] All EFAs and CFAs were performed using MPlus Version 7.[46] Cronbach's alpha reliability coefficient was used to assess the scale's internal consistency.

In order to assess measurement invariance by gender, race, and SES, we performed multiple-group CFA. We first estimated an unconstrained model, in which all the loadings and thresholds were allowed to vary. Next, a constrained model was fit, wherein the loadings and thresholds were set to be equal across groups. We then performed a robust chi-square model difference test using the Mplus DIFFTEST function. Although not explicitly a part of the objectives of this study, we also assessed measurement invariance across time comparing the baseline against the follow-up sample to ensure that participants were responding to the construct in the same way at two different time points.

3.4. Results

The mean age of the sample (N=350) at baseline was 21 years old and the majority of the sample identified as black (65%), female (62%), and heterosexual (79%) (Table 3.1.). Fifty-eight percent of the sample perceived their SES as low. Thirty-eight percent of the sample reported mild to severe depressive symptoms, 21% had ever been arrested, and 70% indicated growing up without a father figure. The median score for the perceived powerlessness scale at baseline was 1.9 (IQR: 1.6-2.4). There were no differences in perceived powerlessness scores by demographic and psychosocial characteristics with the exception of depressive symptoms (i.e., high powerlessness individuals were more likely to report mild to severe depressive symptoms; $p<0.001$) and lifetime arrest (i.e., high powerlessness individuals were more likely to have been arrested; $p = 0.041$).

[Table 3.1. here]

3.4.1. Exploratory Factor Analysis

The results of the EFA conducted on the baseline sample for the perceived powerlessness scale indicated that the scale has a three-factor structure. Items 3, 5, and 12 (refer to Table 3.2.) exhibited high uniqueness values (>0.50) and did not load highly (<0.40) on any factor. These three items were the only items that did not reference oneself; they referenced "we" and "people" rather than "I." Literature also supports the notion that perceived powerlessness should refer to oneself rather than others because beliefs about your community as a whole or other people in general are not necessarily the same as beliefs about oneself.[16] Therefore, based on uniqueness values and factor loadings as well as item wording, items 3, 5, and 12 were dropped from the scale. PCA

and EFA were re-run, and again, the results indicated a three-factor structure -- present perceived powerlessness ("present"), future perceived powerlessness ("future"), and financial perceived powerlessness ("money"). The percent variance explained improved from 63% (12-item scale) to 75% (9-item scale). Results of the final EFA are presented in Table 3.2.

[Table 3.2. here]

3.4.2. Confirmatory Factor Analysis

We specified a second order single-factor model ("power") and a first order three-factor model ("future", "present", and "money") for the CFA given that unidimensionality had not been previously established. Figure 3.1. gives the standardized parameter estimates for the second order single-factor model (baseline only). The model fit indices of the baseline sample suggested that the model was a good fit to the data: degrees of freedom (d.f.) = 24, chi-square (X^2) = 75.073, RMSEA = 0.078, CFI = 0.976, and TLI = 0.964. Model fit indices for the follow-up sample suggested a similarly good fit: d.f. =24, X^2 = 84.660, RMSEA = 0.100, CFI = 0.952, and TLI = 0.929. The alpha coefficient for the 9-item scale was 0.83 (Table 3.2.).

[Figure 3.1. here]

3.4.3. Invariance Analyses

The *p*-values for chi-square difference testing by gender, SES, and time point were not significant (p = 0.219; p = 0.496; p = 0.993, respectively) for the perceived powerlessness scale. An insignificant *p*-value suggests that the larger, unconstrained model does not statistically significantly differ from the smaller, constrained model, and therefore, measurement invariance can be assumed. However, the *p*-value for the test for

measurement invariance by race was significant (p <0.001), indicating measurement non-invariance.

Table 3.3. displays the factor loadings and r-square values by race for the scale and Table 3.4. shows the model fit statistics separately by race. We see that for the perceived powerlessness scale factor loadings are generally higher for the future factor and lower for the present factor among white youth. Item 6 (pp6) is also noticeably higher among white youth compared to black youth. In terms of model fit for the perceived powerlessness scale, the data fit the model slightly better for white youth, but both models exhibited good fit.

[Table 3.3. here]

[Table 3.4. here]

3.5. Discussion and Conclusion

The results of this study indicated that the proposed perceived powerlessness scale is a valid and reliable measure of the construct among a demographically diverse, urban youth population. The perceived powerlessness scale was unidimensional on the second order and multidimensional on the first order. That is, there were three distinct latent variables on the first order and those three dimensions were explained by another underlying latent variable at a higher order – perceived powerlessness. Accordingly, it would be appropriate and meaningful to use the scale as a whole rather than using the first order factors separately.

To our knowledge, this scale is one of the first to include both generalized items and items referencing structural domains. Despite the scale having integrated generalized and structural domain items, results of the EFA and CFA indicated that these two

different sets of items are explained by one latent factor (i.e., "power"). In terms of the first order factors, we would have perhaps expected to find a "general" factor (i.e., generalized items) and three separate structural domain items (i.e., school/job, political participation, and finances/money). Instead, the EFA revealed the following three factors: "present," "future," and "money." The first of these two were related to temporal orientation – feeling powerless in the present versus feeling powerless about the future. The third factor related to feeling powerlessness about one's financial situation ("money"), potentially reflecting the salience of financial concerns to our study population above and beyond other structural factors.

Our findings differed from previous validation studies of perceived powerlessness scales. For example, one study found a multi-dimensional, three-factor structure – affective, motivational and cognitive[50] but another study found that the same exact scale had a one-factor structure when tested with a different study population.[51] Precisely for these reasons, it is important to assess dimensionality of constructs with different populations, especially if the scale items were operationalized differently from previous ones.

The perceived powerlessness scale exhibited a multi-factorial solution, which in part, pointed to the primacy of temporal orientation. A review of the literature indicated that there may be no studies conceptualizing the perceived powerlessness construct in this way with the exception of Frazier and colleagues. Through psychometric testing, the authors found a three factor-structure (i.e., past, current, and future perceived powerlessness).[52] Other scholars have noted the insufficient amount of attention given to the importance of time in the delineation of the perceived powerlessness.[53] Wallston

(1987) theorized that those who feel powerless about the past are troubled by the causes of their health problems.[53] Conversely, those who feel powerless about the future feel less equipped to find solutions their health problems. Therefore, making this temporal distinction is important, because doing so enables practitioners to potentially identify and target those who may not feel responsible for getting a disease, but believe they have control in how they respond to their illness.

Results of the invariance testing indicated that invariance by race was not supported. Differences in factor loadings between groups could occur if the meaning or salience of the construct differs across those groups.[54] Factor loadings were higher for three of the four "future" items among white youth compared to black youth. Conversely, factor loadings were higher for all three of the "present" items among black youth. A study looking at temporal orientation among white and black individuals found that black individuals may be more present-oriented in their health beliefs when compared to white individuals.[55] Several scholars have theorized that the present-oriented mindset and beliefs among black individuals is likely a psychological response to the uncertain nature of their environment that stems from their marginalization.[55-57] It is not that black youth are inherently present-oriented, but rather that the experiences of discrimination and limited opportunities as a social group creates sense of elusiveness for controlling future behaviors and outcomes. Ethnographic work with urban black youth has shown that this sense of powerlessness about the future is not uniform within the group or even within a person.[58] An individual may feel powerless about future economic opportunities but not feel powerless about other domains. Therefore, our results on temporal orientation must be interpreted with caution.

When we look closely at the wording of the financial perceived powerlessness items, we also see that one item refers more to present concerns (pp4) and the other is more future oriented since it is about saving money (pp6). In line with patterns of the "present" and "future" factors, the factor loadings were higher for present financial concerns and lower for future financial concerns among black youth. In short, results of the invariance testing may again be supporting the notion that temporal orientation may be playing a role as it was during assessment of dimensionality. Understanding that perceived powerlessness may work through race-specific mechanisms can help with the development of tailored interventions. Additional qualitative research on how different racial groups conceive perceived powerlessness may help clarify these findings.

In contrast to race, invariance across gender and SES was supported, implying that both male and female (or low and high SES) participants were using the same underlying framework and metric when responding to the scale.[18,43,59] There are a dearth of studies looking at measurement invariance across gender and possibly none across SES. One study found that a perceived powerlessness measure was invariant across gender in an adolescent Chinese population.[60] Measurement and threshold invariance ensure that any group differences in perceived powerlessness is reflective of real differences of the construct and not measurement artifacts. On the other hand, findings on non-invariance across race requires future analyses to stratify samples by race since the underlying latent construct may hold different meanings for each group. Future studies involving latent constructs and demographically diverse samples should ideally test for measurement invairnce across groups, even if doing so means that the scale's use becomes more limited and analyses involving the scale become more complex.

The study was characterized by several limitations. All items in the perceived powerlessness scale were negatively worded, but ideally a scale would contain a balanced number of positively and negatively worded items. Our results indicated that temporal orientation is an appropriate way to conceptualize perceived powerlessness, but none of the items included references to feeling powerless about the past. To improve content validity, future scales should consider items assessing powerlessness in the past to allow for a more complete representation of all domains.[61] In addition, our sample consisted of urban youth and results may not be generalizeable to youth living in non-urban areas.

The study also had several strengths. A demographically diverse and longitudinal sample allowed for testing of measurement invariance across race, gender, SES, and time. This study was also the first to employ a scale consisting of both generalized items and structural domain items. There were also several methodological strengths to study. We treated and analyzed the indicators as categorical, which many studies often do not do, despite having employed ordinal items that do not have a multivariate normal distribution. We used EFA to explore the number of factors and their substantive meaning and then subsequently tested the factor structure using CFA rather than using just EFA or CFA alone. Lastly, we conducted the CFA on both baseline and follow-up samples, which strengthen the interpretation of our results.

In conclusion, our results showed that the perceived powerlessness scale can be treated as a valid and reliable measurement instrument to assess perceived powerlessness among urban youth. The results of this study also support its use as a valid measure across gender and SES. However, invariance across race was not supported, meaning direct comparison of group differences in perceived powerlessness by race should not be

made. There is great potential for the use of the scale in future health behavior and outcome studies among urban youth and especially among those who live in disadvantaged neighborhoods with limited economic and educational opportunities. With use of longitudinal datasets, we would be able to assess the predictive utility of the validated perceived powerlessness scale on various health behaviors and outcomes, including sexual risk behaviors and sexually transmitted infections -- an urgent health concern for urban youth.

3.6. Tables and Figures

Table 3.1. Participant characteristics by low vs. high perceived powerlessness* at baseline (N = 350)

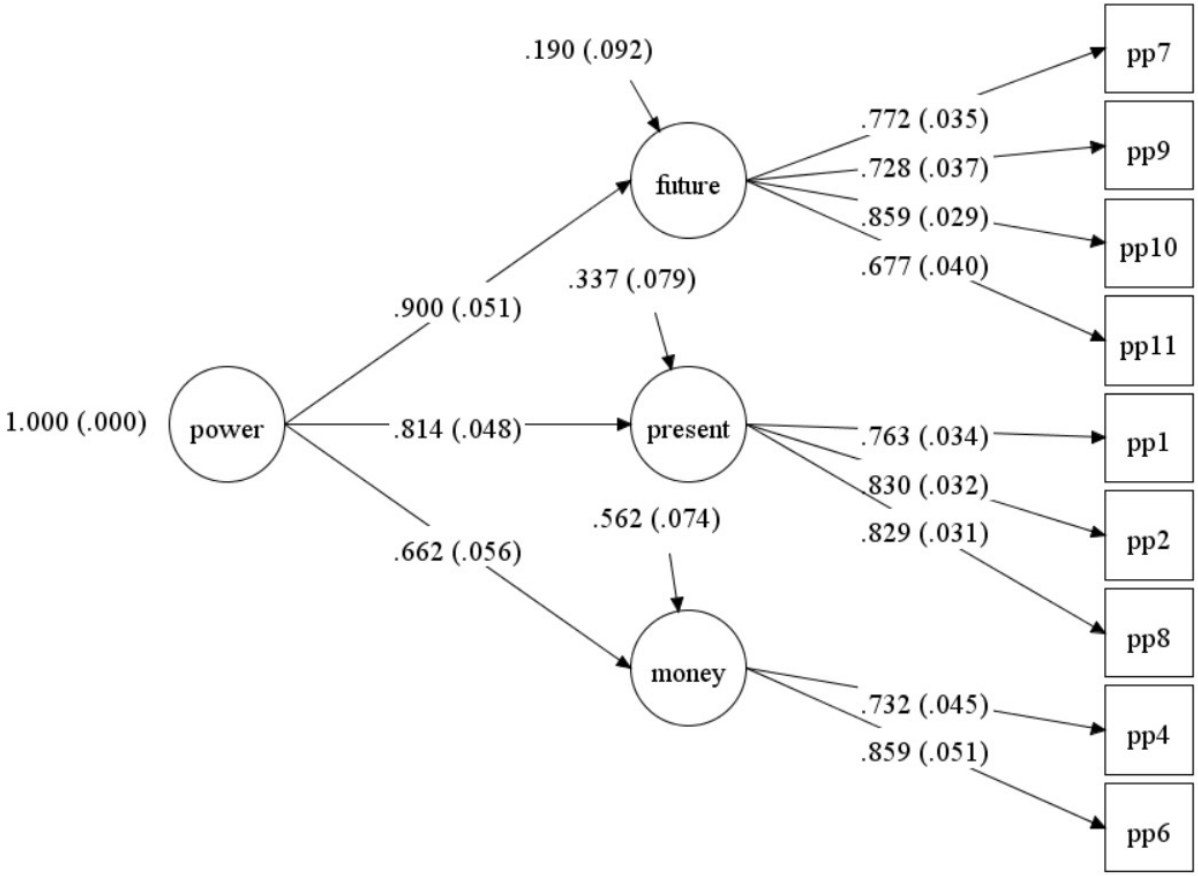
	Total		Low powerlessness		High powerlessness		
	n	(%)	n	(%)	n	(%)	*p-value*
Age (Mean, SD)	21.0	(2.6)	21.0	(2.6)	21.0	(2.5)	0.945
Gender							
Female	218	(62.3)	101	(47.0)	114	(53.0)	0.717
Male	132	(37.7)	58	(45.0)	71	(55.0)	
Race							
Black	228	(65.1)	110	(49.1)	114	(50.9)	0.142
White	122	(34.9)	49	(40.8)	71	(59.2)	
SES							
Low	204	(58.1)	88	(43.6)	114	(56.4)	0.152
High	141	(40.9)	71	(51.5)	67	(48.6)	
Sexual orientation							
Heterosexual	259	(78.7)	123	(47.9)	134	(52.1)	0.230
Non-heterosexual	70	(21.3)	27	(39.7)	41	(60.3)	
Depressive Symptoms (≥16)	128	(37.9)	35	(27.3)	93	(72.7)	**<0.001**
Ever arrested	75	(21.4)	26	(35.6)	47	(64.4)	**0.041**
Grew up without a dad	243	(70.0)	115	(48.5)	122	(51.5)	0.221

*Dichotomized at median (<1.9:low vs. ≥1.9: high)

Table 3.2. Results of exploratory factor analysis on the perceived powerlessness scale at baseline

Item (overall scale α= 0.83)	Exploratory Factor Analysis	
	loading	uniqueness
Factor 1: present perceived powerlessness		
pp1. Sometimes I feel that I am being pushed around in life	0.738	0.385
pp2. When I have a problem, I do not feel confident I can solve it	0.845	0.256
pp8. At school or work, I do not always speak up when I have something to say because I do not think anyone will listen to me	0.668	0.339
Factor 2: future perceived powerlessness		
pp7. I do not think that my education has prepared me to achieve a successful career	0.530	0.465
pp9. I do not think much about voting in the future because politicians are not interesting in helping to improve the situation of people like me	0.867	0.358
pp10. There is no point in trying to change things for the better because no one cares or wants to help	0.806	0.272
pp11. Working hard in school or on the job does not guarantee better opportunities later on	0.577	0.552
Factor 3: financial perceived powerlessness		
pp4. I worry about money because jobs for me or my family members are not easy to find or keep	0.900	0.243
pp6. Saving money is hard to do in my household because we already have a hard time paying the bills	0.678	0.426
Deleted items		
pp3. When bad things happen, we are not supposed to know why. We are just supposed to accept them.	N/A	N/A
pp5. People die when it is their time to die, and nothing can change that.	N/A	N/A
pp12. Most people in my life want something better but do not know how to get it.	N/A	N/A

Figure 3.1. Standardized parameter estimates of the second order single-factor model of perceived powerlessness scale at baseline



*values in parenthesis are standard errors of the parameter estimates

Table 3.3. Factor loadings and r-square values by race for perceived powerlessness scale at baseline

	Factor loadings and R-square values by race				
			Factor loadings	R-Square	
	Item		Black	White	Black	White
Perceived powerlessness	Future by					
		pp7	0.701	0.896	0.619	0.627
		pp9	0.710	0.761	0.535	0.542
		pp10	0.883	0.873	0.776	0.786
		pp11	0.631	0.744	0.464	0.470
	Present by					
		pp1	0.806	0.671	0.601	0.606
		pp2	0.849	0.816	0.697	0.703
		pp8	0.900	0.702	0.710	0.716
	Money by					
		pp4	0.719	0.715	0.521	0.526
		pp6	0.742	0.928	0.683	0.689

Table 3.4. Model fit statistics by race for perceived powerlessness scale at baseline

Perceived powerlessness	**Black**	**White**
Degrees of Freedom	25	25
Chi-square	69.146	50.231
RMSEA	0.088	0.091
CFI	0.968	0.972
TLI	0.954	0.960

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4. PERCEIVED POWERLESSNESS AND SEXUAL RISK BEHAVIORS AMONG URBAN YOUTH

4.1. Abstract

Youth bear a disproportionate burden of sexually transmitted infections (STIs) in the U.S. Generalized perceived powerlessness is an underexplored psychosocial construct that may influence sexual risk-taking among youth. However, there are a dearth of robust, longitudinal studies looking at the relationship between generalized perceived powerlessness and sexual risk behaviors among young people. This study had two aims: (1) to determine whether perceived powerlessness predicts a range of sexual risk behaviors (i.e., multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency) among a demographically diverse sample of urban youth; and (2) to determine whether sub-domains of perceived powerlessness (i.e., present, future, and financial powerlessness) uniquely predict these same four sexual risk behaviors. We employed multiple logistic regression and found that perceived powerlessness predicted report of multiple partners, inconsistent condom use, and condomless sex at last sex controlling for age, race, gender, and socioeconomic status. When the three sub-domains of perceived powerlessness were entered into one model as separate predictors, only financial perceived powerlessness predicted report of multiple partners and inconsistent condom use. STI interventions should aim to reduce perceived powerlessness as well as the structural determinants that lead a young person to feel powerless. STI interventions would also benefit from directing additional efforts at reducing feelings of financial powerlessness.

4.2. Introduction

Adolescence and young adulthood are important developmental periods in which beliefs, values, and expectations are formed, setting the foundation for subsequent health trajectories.[1,2] Initiation of sex and sexual experimentation are one of many developmental tasks that youth face.[3] While developmentally normative, sexual risk behaviors increase in adolescence and peak in young adulthood, contributing to elevated sexually transmitted infections (STIs) among youth compared to adults.[4] Data from 2008 showed that nearly 50% of STI incidence occurred among youth aged 15 to 24 years despite the fact that they represent 25% of the sexually active population.[5]

The STI epidemic is also characterized by substantial persistent gender, racial, and socioeconomic disparities. Both total prevalence and incidence of the eight most common STIs were higher among female compared to male youth in 2008.[5] Fifteen to nineteen year old black females had over five times the rate of chlamydia infections (1,458.3 per 100,000 females) compared to their white counterparts in 2012.[6] A nationwide U.S. study with young adults found that the poorest quintile was at 83% higher odds of STIs (i.e., Chlamydia, Gonorrhea or Trichomoniasis) diagnosis when compared to the richest quintile.[7] While a significant amount of scholarly work has identified determinants of sexual risk and of demographic disparities in STIs, these trends have remained persistent.

Perceived powerlessness is a generalized psychosocial construct that may drive sexual risk and is defined as "the belief that one can[not] determine or control one's own internal states and behavior, influence one's environment, and/or bring about desired outcomes."[8] Social Cognitive Theory articulates that an individual's perception of

powerlessness, or conversely of control, plays a central role in determining his or her well-being.[9] Perceived powerlessness both directly and indirectly influences health behavior; those with higher perceptions of powerlessness set lower goals, exhibit lower persistence in engaging in behaviors, and perceive social and structural impediments to the changes they seek to be insurmountable.[9] Specifically, feeling powerless has been linked to various adverse health behaviors and outcomes such as lower medication adherence[10] and depression.[11-15]

Less commonly, perceived powerlessness has also been shown to influence sexual risk behaviors, including among youth.[16-18] However, the majority of the studies conducted among young people look at proximal and behavior-specific rather the generalized form of perceived powerlessness. Examples of behavior-specific powerlessness include powerlessness in sexual communication,[19] condom negotiation,[19-21] and sexual risk reduction.[22-24] In contrast, the generalized construct does not have any reference to a preventive health behavior. An example of a generalized construct is, "sometimes I feel that I am being pushed around in life." While behavior-specific perceived powerlessness remains important, the generalized form of the construct has also been shown to independently predict sexual risk behavior.[18] Moreover, targeting the generalized and more distal construct may be more effective in preventing a wider range of sexual risk behaviors (e.g., targeting powerlessness in condom negotiation may improve condom use but not concurrency or multiple partners) while better addressing the more distal causes of sexual risk.

Perceived powerlessness is often an individual's subjective reflection of his or her objective lack of control and power.[8,25] Objective powerlessness, in turn, is influenced by

an individual's social position, including his or her socioeconomic status (SES), race, and gender.[14,26-30] Restrictions in access to resources and power on an objective level results in a profound sense or perception that one's life outcomes are not responsive to his or her efforts and choices.[31,32] Therefore, increasing one's level of perceived power might not only increase engagement in healthy behavior, but it also might reduce health disparities among those who occupy low social status.

A search of the literature yielded a small number of studies that assessed the association between generalized perceived powerlessness and sexual risk behavior among youth. Most studies employed a cross-sectional sample and found that generalized perceived powerlessness was associated with age of onset of sexual intercourse,[33,34] condomless sex,[34,35] and inconsistent condom use.[16,36] Only two studies employed a longitudinal sample, both of which found that perceived powerlessness predicted age of onset of sexual intercourse[17] and condomless sex.[18] However, one of the studies suffered from substantial attrition (62.5%)[17] and the other employed a single-item to assess perceived powerlessness.[18] In short, there are dearth of robust longitudinal studies employing a validated, generalized perceived powerlessness construct to predict sexual risk among youth.

This study's primary objective is to determine whether a validated, generalized perceived powerlessness construct (perceived powerlessness, hereafter) predicts a range of sexual risk behaviors (i.e., multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency) among a demographically diverse, longitudinal household sample of youth in Baltimore, MD. The secondary objective is to determine how different sub-domains of perceived powerlessness (i.e., present, future, and financial

powerlessness) uniquely predict a range of sexual risk behaviors. Assessment of sub-domains may provide us with a more nuanced understanding of drivers of sexual risk and ultimately inform the development of targeted interventions to address the STI epidemic among youth.

4.3. Methods

4.3.1. Participants and Procedures

The current analysis stems from a longitudinal household study of youth, aged 16-25 years old. Data were collected from February 2011 through May 2013 and yielded a baseline sample of 350 participants and a six-month follow-up sample of 257. Details of study methods have been described elsewhere.[37] Briefly, investigators employed a stratified sampling design by census block groups (CBGs) to allow for oversampling in areas with high concentrations of the target population. A probability-based sample of residential mailing addresses were then generated within each CBG. Participants were eligible if they were black or white, English speaking, sexually active, between the ages of 16 and 25 years old, and residing in Baltimore City. Parental/guardian informed consent and adolescent informed assent were obtained for individuals younger than 18 years old. Informed consent was obtained for individuals 18 years or older.

Of the 12,000 households that were sent letters, 10,509 were successfully contacted. Of those who were contacted, 281 household were eligible, and 237 agreed to participate (84%). The study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Consented and enrolled participants were administered an audio computer-assisted self-interview (A-CASI) in a private setting. The A-CASI survey captured information on demographics, perceived

powerlessness, various psychosocial variables (e.g., social support, gender attitudes, and need for sexual validation), and individual- and partner-related sexual risk behaviors (e.g., condomless sex, concurrency, and number of partners).

4.3.2. Measures

Perceived Powerlessness The 9-item perceived powerlessness scale was previously developed to reflect the Baltimore context, which is characterized by lack of educational and economic opportunities as well as high rates of poverty and violence.[6,38,39] Previous scale validation indicated that the perceived powerlessness scale was a valid and reliable measure (α=0.83) (See Chapter 3 of thesis). Results of earlier psychometric testing indicated that the scale had three sub-domains (present, future, and financial perceived powerlessness). Appendix 4.1. shows the three sub-domains and their corresponding items in the perceived powerlessness scale. The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). All items were reverse coded so that higher scores indicated greater levels of perceived powerlessness. A total perceived powerlessness score was generated by adding the individual items then dividing by the total number of items, resulting in a summary score.

Sexual Risk Behaviors We looked at a total of four recent (past six months) sexual risk behaviors: multiple partners (>1 vs. ≤1), inconsistent condom use (always vs. <always during vaginal or anal sex), condomless sex at last sex (yes vs. no condom during vaginal or anal sex), and concurrency (yes vs. no). Concurrency was measured by asking participants whether they had vaginal or anal sex with anyone other than the partner(s) they had listed while they were seeing that partner.

Covariates Based on the literature, we examined the following covariates: age (continuous), gender (male vs. female), race (black vs. white), SES (low vs. high), sexual orientation (heterosexual vs. non-heterosexual, including gay or bi-sexual), depressive symptoms (CESD: <16 (below clinical threshold) vs. ≥16 (mild to severe)),[40] ever arrested (yes vs. no), and grew up without a dad (yes vs. no). For SES, we employed a subjective construct (i.e., perceived SES). Perceived SES was measured using an image of a ladder with ten rungs (values ranging from 1 to 10 with 1 indicating higher perceived SES). Participants were asked to place themselves based on where they think they stand in society in terms of money, education, or jobs.[41,42] The scores were then dichotomized (low SES (≥6) vs. high SES (< 6)).

4.3.3. Data Analysis

For descriptive purposes, differences in key demographic and psychosocial variables by perceived powerlessness level (low vs. high; dichotomized at median) were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous variables with significance set at $\alpha<0.05$. Differences in demographic and psychosocial variables by type of sexual risk behavior were also examined via chi-squared tests. We then used multivariate logistic regression to test the relationship between perceived powerlessness at baseline (total score) and each of the sexual risk behaviors at six-month follow-up, adjusting for theoretically relevant demographic variables (i.e., age, gender, race, and SES) that have shown to be associated with both the predictor and outcome. Additional analyses employed multivariate logistic regression to test the relationship between three of the sub-domains (entered as separate predictors in one model), adjusting for theoretically relevant demographic variables (i.e., age, gender, race, and SES). These

analyses tested whether any of the three sub-domains uniquely predicted a sexual risk behavior, above and beyond the two other sub-domains. Because the three sub-domains might be highly correlated, we assessed for multicollinearity of independent variables based on variance of inflation factors (cutoff of <10).[43] There was no evidence for multicollinearity in the regression models (results not shown). All statistical analyses were conducted in STATA, Version 13.[44]

4.4. Results

The mean age of the sample (N=350) at baseline was 21 years old and the majority of the sample identified as black (65%), female (62%), and heterosexual (79%) (Table 4.1.). Fifty-eight percent of the sample perceived their SES as low. Thirty-eight percent of the sample reported mild to severe depressive symptoms, 21% had ever been arrested, and 70% indicated growing up without a father figure. There were no differences in levels of perceived powerlessness by these characteristics with the exception of depressive symptoms (i.e., high powerlessness individuals were more likely to report mild to severe depressive symptoms; $p<0.001$) and lifetime arrest (i.e., high powerlessness individuals were more likely to have been arrested; $p=0.041$). To ensure comparability of baseline versus follow-up samples, we compared key demographic factors, perceived powerlessness scores, and sexual risk behaviors over time and did not find any statistically significant differences (results not shown).

[Table 4.1. here]

Prevalence of sexual risk behaviors at six-month follow-up varied widely. Twenty-seven percent of participants reported multiple partners, 53% reported inconsistent condom use, 51% reported condomless sex at last sex, and 15% reported

concurrency (Table 4.2.). At the bivariate level, being male and reporting high powerlessness were associated with reporting multiple partners (p<0.001 and p=0.016, respectively). Increasing age and being white were associated with inconsistent condom use (p<0.001 and p=0.002, respectively). Similarly, increasing age and being white were associated with condomless sex at last sex (p=0.002 and p=0.013, respectively). Lastly, being black and reporting mild to severe depressive symptoms were associated with reporting a concurrent relationship (p=0.037 and p=0.004, respectively).

[Table 4.2. here]

Results of multivariate logistic regression indicated that perceived powerlessness was a significant predictor of three sexual risk behaviors (Table 4.3.). Adjusting for age, race, gender, and SES, those with high powerlessness were at more than twice the odds of reporting multiple partners compared to those with low powerlessness (adjusted Odds Ratio (aOR): 2.13, p=0.019). In this model, being male was also associated with reporting multiple partners (aOR: 0.22, p<0.001). Those with high powerlessness were at nearly two times the odds of reporting inconsistent condom use and condomless sex at last sex compared to those with lower powerlessness (aOR: 1.76, p=0.042; aOR: 1.70, p=0.049, respectively). Being older and white were also associated with inconsistent condom use (aOR: 1.21, p<0.001; aOR: 2.38, p=0.004, respectively) and condomless sex at last sex (aOR: 1.18, p=0.001; aOR: 1.77, p=0.048, respectively). Perceived powerlessness was not a significant predictor of concurrency.

[Table 4.3. here]

When the three sub-domains of the perceived powerlessness scale were entered into one model as separate predictors, only financial perceived powerlessness predicted

report of multiple partners and inconsistent condom use (Table 4.4.). Those with high financial perceived powerlessness had a 1.63 higher odds of reporting multiple partners compared to those with low financial perceived powerlessness adjusting for key demographic factors (aOR: 1.63, p= 0.012). Those with high financial perceived powerlessness were also at 1.62 higher odds of reporting inconsistent condom use compared to those with low financial perceived powerlessness (aOR: 1.62, p=0.003). [Table 4.4. here]

4.5. Discussion

We found that perceived powerlessness was a significant predictor of a range of sexual risk behaviors among a demographically diverse sample of urban youth. Perceived powerlessness had the strongest association with reporting multiple partners, followed by inconsistent condom use and condomless sex at last sex. Perceived powerlessness did not significantly predict odds of concurrency, which was likely due to the small number of participants who reported concurrency at follow-up (n=38 (15.0%)). Consistent with prior research, our results showed differences in sexual risk by age, gender, and race: 1) males were more likely to report multiple partners than females;[45] and 2) older and white participants were more likely to report inconsistent condom use and condomless sex compared to younger and black participants.[18,46]

These results on demographic differences in sexual risk behavior support the growing body of evidence that increased sexual risk behaviors do not entirely account for the increased STIs among certain demographic groups. For instance, there has been increased recognition of the role that sexual networks play in explaining racial disparities in STIs. Black individuals participate in sexual networks that are characterized by a high

prevalence of infection, assortative mixing by race, and disassortative mixing by risk – a mixing pattern even when coupled with relatively low levels of sexual risk behaviors result in elevated STIs.[47,48] Our study results, therefore, point to the need for interventions to not only reduce sexual risk behaviors, but also consider other non-behavioral factors such as sexual networks in order to reduce disparities in STIs.

Results from additional analyses employing the three sub-domains of perceived powerlessness showed that increased financial perceived powerlessness uniquely predicted multiple partners and inconsistent condom use above and beyond the two other domains and demographic variables. To the best of our knowledge, financial powerlessness has not been examined as a predictor of any kind of health behavior, much less sexual risk behavior. Perceived SES explicitly assesses an individual's perception of his or her SES while financial powerlessness assesses feelings of powerlessness and lack of control surrounding one's financial security. However, perceived SES was not associated with any of the sexual risk behaviors in our multivariate analyses, suggesting that perhaps financial perceived powerlessness could be a more appropriate measure when thinking about economic drivers of sexual risk. In support of Social Cognitive Theory, cognitive appraisals of financial powerlessness may be more central in determining behaviors than explicit assessment of one's financial or economic standing. Future studies should explore the intermediary mechanisms by which financial powerlessness leads to sexual risk taking. Gender norms could be one potential mediator; previous studies have shown that in response to socioeconomic deprivation, individuals cope by adhering more strongly to hyper-masculine or hyper-feminine attitudes at the expense of STI preventive behavior.[49-52]

STI interventions must address one's sense of powerlessness or lack of control in order to affect real behavior change.[9,36] To do so, interventions must seek to increase both individual and collective efficacy through empowerment-based approaches, which involves mastering experiences, vicarious experiences (i.e., watching other successfully complete a task or goal) and verbal persuasion (i.e., convinced by someone else that the individual can complete the task).[9] Peer-based interventions, in particular, have been shown to effectively empower participants precisely through these mechanisms as well as to reduce sexual risk behavior.[53-55] Clinical interventions that foster cognitive emotional regulation (e.g., increasing awareness of one's emotional state) have also been shown to effectively diminish one's sense of powerlessness.[56,57]

Results of our study suggest that increasing perceived power in a general context can be useful. Social Cognitive Theory does not specify how perceived powerlessness should be measured and operationalized. Consequently, many studies focus on measuring proximal and behavior-specific powerlessness, and sexual risk reduction interventions focus on empowerment-based approaches in a much narrower context such as practicing condom negotiation skills.[19-24] An intervention may help a young person feel empowered about negotiating condom use (i.e., a form of behavior-specific perceived powerlessness) but he or she may not use a condom due to a more profound and general sense of powerlessness. In addition to explicitly addressing a general sense of powerlessness, it will also be important to address the social determinants of powerlessness by providing youth with increased opportunities for participation in academic, economic, and political arenas. Our study results also provide the basis for paying added attention to determinants that lead an individual to feel financially powerless.

Our study was characterized by several limitations. The loss to follow-up was moderate at 26.5% (93/350), but a post-hoc analysis comparing key demographics, as well as the predictor and outcomes, indicated no statistically significant differences between those who were lost to follow-up versus those who remained in the study. Because this study was based on secondary data analysis, we were not able to consider other important control variables such as previous experience of violence victimization, which has shown to influence both perceived powerlessness[12,58] and sexual risk behavior.[59] Our results on financial powerlessness may not be generalizeable to other urban cities where economic security and opportunities may be better than in Baltimore City. Lastly, we were not able to incorporate covariates beyond individually measured ones such as neighborhood-level poverty, for example.

Despite these limitations, this study is the first to predict multiple sexual risk behaviors among young people using a validated, multi-item measure of generalized perceived powerlessness. Through use of a demographically diverse and longitudinal sample, we were able to account and assess for differences in demographic factors as well as arrive at sounder temporal conclusions between perceived powerlessness and sexual risk behavior. Finally, we were able to determine the unique contribution of the financial powerlessness sub-domain in predicting sexual risk behavior. Parents, researchers, and service providers may often deny youth a sense of agency because of their age. However, if it is known that decisions made by youth set the trajectory for their well-being and future sexual experiences,[18] interventions should foster that ability sooner than later. Helping youth develop that sense of control and power to make decisions for

themselves, therefore, is a critical part of transitioning to adulthood and of ultimately addressing the STI burden among this age group.

4.6. Tables

Table 4.1. Participant characteristics by low vs. high perceived powerlessness* at baseline (N=350)

	Total		**Low powerlessness**		**High powerlessness**		
	n	(%)	n	(%)	n	(%)	*p-value*
Age (Mean, SD)	21.0	(2.6)	21.0	(2.6)	21.0	(2.5)	0.945
Gender							
Female	218	(62.3)	101	(47.0)	114	(53.0)	0.717
Male	132	(37.7)	58	(45.0)	71	(55.0)	
Race							
Black	228	(65.1)	110	(49.1)	114	(50.9)	0.142
White	122	(34.9)	49	(40.8)	71	(59.2)	
SES							
Low	204	(58.1)	88	(43.6)	114	(56.4)	0.152
High	141	(40.9)	71	(51.5)	67	(48.6)	
Sexual orientation							
Heterosexual	259	(78.7)	123	(47.9)	134	(52.1)	0.230
Non-heterosexual	70	(21.3)	27	(39.7)	41	(60.3)	
Depressive symptoms (≥16)	128	(37.9)	35	(27.3)	93	(72.7)	**<0.001**
Ever arrested	75	(21.4)	26	(35.6)	47	(64.4)	**0.041**
Grew up without a dad	243	(70.0)	115	(48.5)	122	(51.5)	0.221

*Dichotomized at median (<1.9:low vs. ≥1.9: high)

Table 4.2. Participant characteristics by recent* sexual risk behaviors at follow-up (N = 257)

	Total		Multiple partners, N=67			Inconsistent condom use**, N=134			Condomless sex at last sex***, N=129			Concurrency***, N=38		
	N	(%)	n	(%)	*p-value*	n	(%)	*p-value*	n	(%)	*p-value*	n	(%)	*p-value*
Age (Mean, SD)	21.0	(2.6)	20.8	(2.5)	0.471	21.5	(2.6)	**<0.001**	21.5	(2.7)	**0.002**	21.3	(2.4)	0.486
Gender														
Female	164	(64.6)	27	(16.6)	**<0.001**	93	(56.7)	0.089	44	(48.9)	0.654	20	(12.2)	0.095
Male	90	(35.4)	40	(45.5)		41	(45.6)		85	(51.8)		18	(20.0)	
Race														
Black	170	(66.9)	44	(26.0)	0.735	78	(45.9)	**0.002**	77	(45.3)	**0.013**	31	(18.2)	**0.037**
White	84	(33.1)	23	(28.1)		56	(66.7)		52	(61.9)		7	(8.3)	
SES														
Low	149	(59.8)	41	(27.7)	0.576	75	(50.3)	0.380	69	(46.3)	0.134	23	(15.4)	0.044
High	100	(40.2)	24	(24.5)		56	(56.0)		56	(56.0)		12	(12.0)	
Sexual orientation														
Heterosexual	184	(77.6)	46	(25.4)	0.136	104	(56.5)	0.091	93	(50.5)	0.592	22	(12.0)	0.051
Non-heterosexual	53	(22.4)	19	(35.9)		23	(43.4)		29	(54.7)		12	(22.6)	
Depressive symptoms (≥16)														
Yes	96	(39.5)	30	(31.3)	0.142	55	(57.3)	0.288	55	(57.3)	0.074	21	(21.9)	**0.004**
No	147	(60.5)	33	(22.8)		74	(50.3)		67	(45.6)		13	(8.8)	
Ever arrested														
Yes	49	(19.3)	15	(31.9)	0.369	31	(63.3)	0.101	28	(57.1)	0.322	8	(16.3)	0.765
No	205	(80.7)	52	(25.5)		103	(50.2)		101	(49.3)		30	(14.6)	
Grew up without a dad														
Yes	175	(69.4)	46	(26.7)	0.899	89	(50.9)	0.465	89	(50.9)	0.826	26	(14.9)	0.882
No	77	(30.6)	20	(26.0)		43	(55.8)		38	(49.4)		12	(15.6)	
Perceived powerlessness														
Low	114	(45.6)	22	(19.3)	**0.016**	53	(46.5)	0.067	50	(43.9)	0.075	12	(10.5)	0.110
High	136	(54.4)	44	(32.8)		79	(58.1)		75	(55.2)		24	(17.7)	

*past six months **<always during vaginal/anal sex ***vaginal/anal sex

Table 4.3. Logistic regression models of recent* sexual risk behaviors at follow-up on perceived powerlessness† (N=257)

	Multiple partners			**Inconsistent condom use****			**Condomless sex at last sex*****			**Concurrency*****		
	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*
Age	1.01	(0.89, 1.13)	0.927	1.21	(1.09, 1.35)	**<0.001**	1.18	(1.07, 1.31)	**0.001**	1.11	(0.96, 1.23)	0.153
Gender	0.22	(0.11, 0.40)	**<0.001**	1.62	(0.92, 2.86)	0.100	1.06	(0.61, 1.85)	0.841	0.43	(0.20, 0.93)	**0.031**
Race	0.85	(0.44, 1.63)	0.616	2.38	(1.32, 4.31)	**0.004**	1.77	(1.01, 3.13)	**0.048**	0.39	(0.16, 0.96)	**0.040**
SES	1.10	(0.58, 2.07)	0.778	1.22	(0.70, 2.10)	0.485	1.55	(0.90, 2.65)	0.112	0.86	(0.39, 1.89)	0.712
Perceived Powerlessness	2.13	(1.13, 4.00)	**0.019**	1.76	(1.02, 3.02)	**0.042**	1.70	(1.00, 2.89)	**0.049**	1.78	(0.82, 3.85)	0.145

†Models were adjusted for age, gender, race, and SES

*past six months

**<always during vaginal/anal sex

***vaginal/anal sex

Table 4.4. Logistic regression models of recent* sexual risk behaviors at follow-up on subdomains of perceived powerlessness† (N=257)

	Multiple partners			Inconsistent condom use**			Condomless sex at last sex***			Concurrency***		
	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*	aOR	(95% C.I.)	*p-value*
3 subdomains												
Financial	1.63	(1.11, 2.37)	**0.012**	1.62	(1.18, 2.24)	**0.003**	1.26	(0.93, 1.71)	0.142	1.44	(0.91, 2.27)	0.123
Present	0.94	(0.61, 1.45)	0.790	0.82	(0.55, 1.23)	0.342	1.07	(0.73, 1.57)	0.724	1.27	(0.78, 2.09)	0.338
Future	0.98	(0.60, 1.60)	0.930	1.15	(0.74, 1.81)	0.535	1.11	(0.72, 1.71)	0.635	0.91	(0.50, 1.64)	0.747

†Models were adjusted for age, gender, race, and SES
*past six months
**<always during vaginal/anal sex
***vaginal/anal sex

4.7. Appendix

Appendix 4.1. Item wording in 9-item Perceived Powerlessness Scale

Sub-domain 1: Present Perceived Powerlessness
pp1. Sometimes I feel that I am being pushed around in life
pp2. When I have a problem, I do not feel confident I can solve it
pp8. At school or work, I do not always speak up when I have something to say because I do not think anyone will listen to me
Sub-domain 2: Future Perceived Powerlessness
pp7. I do not think that my education has prepared me to achieve a successful career
pp9. I do not think much about voting in the future because politicians are not interesting in helping to improve the situation of people like me
pp10. There is no point in trying to change things for the better because no one cares or wants to help
pp11. Working hard in school or on the job does not guarantee better opportunities later on
Sub-domain 3: Financial Perceived Powerlessness
pp4. I worry about money because jobs for me or my family members are not easy to find or keep
pp6. Saving money is hard to do in my household because we already have a hard time paying the bills

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5. ASSESSMENT OF THE LONGITUDINAL ASSOCIATION BETWEEN PERCEIVED POWERLESSNESS AND SEXUAL RISK BEHAVIORS AMONG URBAN YOUTH: MEDIATING AND MODERATING EFFECTS

5.1. Abstract

The sexually transmitted infection (STI) epidemic is characterized by substantial and persistent disparities across age, SES, race, and gender. Generalized perceived powerlessness (PP) has shown to predict various sexual risk behaviors among youth, but no studies have assessed for mediators in this relationship. This study had two aims: First, we sought to determine whether a novel psychosocial construct – the need for sexual validation (NSV) – mediates the relationship between PP and sexual risk behaviors among a demographically diverse, longitudinal sample of urban youth; and second, we assessed whether this mediated pathway is moderated by SES and gender. We employed structural equation modeling (SEM) to assess mediation and multi-group SEM to assess moderated mediation. Models were stratified by race due to earlier psychometric testing that showed measurement non-invariance of the PP and NSV scales by race. Results of SEM indicated that NSV mediated condomless sex at last sex among black youth and concurrency among white youth. Results of multi-group SEM indicated that the pathway from PP to NSV to concurrency among whites depended on levels of SES. Our findings highlighted the vulnerability of an overlooked sub-group – low SES white youth – and demonstrated the importance of examining within group differences in sexual risk behaviors. Future studies should continue to assess mediating and moderating factors. STI interventions should aim to reduce both PP and NSV as well as the structural conditions that drive young people to feel powerless. STI interventions must identify vulnerable sub-groups and tailor interventions to the specific needs of those individuals.

5.2. Introduction

Adolescence and young adulthood are important developmental periods in which beliefs, values, and expectations are formed, setting the foundation for subsequent health trajectories.[1,2] Initiation of sex and sexual experimentation are one of many developmental tasks that youth face.[3] While developmentally normative, sexual risk behaviors increase in adolescence and peak in young adulthood, resulting in elevated sexually transmitted infections (STIs) among youth compared to adults.[4] Data from 2008 showed that nearly 50% of STI incidence occurred among youth aged 15 to 24 years despite the fact that they represent 25% of the sexually active population.[5] Further, the STI epidemic among youth is characterized by substantial socioeconomic and gender disparities. A nationwide U.S. study among youth found that the poorest quintile was at 83% higher odds of STIs (Chlamydia, Gonorrhea or Trichomoniasis) diagnosis when compared to the richest quintile.[6] Both total prevalence and incidence of the eight most common STIs were higher among female youth compared to their male counterparts in 2008.[5] While a significant amount of scholarly work has identified determinants of sexual risk and of demographic disparities in STIs, these trends have remained persistent.

Perceived powerlessness (PP) is a psychosocial construct that may drive sexual risk and is defined as "the belief that one can[not] determine or control one's own internal states and behavior, influence one's environment, and/or bring about desired outcomes."[7] Social Cognitive Theory articulates that an individual's perception of powerlessness, or conversely of control, plays a central role in determining his or her well-being.[8] Feeling powerless has been linked to various adverse health behaviors and

outcomes such as lower medication adherence,[9] depression,[10-14] and sexual risk behaviors (e.g., condomless sex).[15-17]

PP can either be generalized without reference to a specific health behavior or it can be behavior-specific. The majority of studies looking at PP and sexual risk behavior among youth have employed a behavior-specific PP measure. It is not difficult to consider, for example, how feeling powerless about condom negotiation (a form of behavior-specific PP) can lead to inconsistent condom use.[18-20] In contrast, making the theoretical and empirical connection between generalized PP – a non-sexual and more distal psychosocial construct – and sexual risk behavior can be more tenuous, contributing to reasons why the generalized construct is underexplored. Nonetheless, a small number of studies have demonstrated that generalized PP (PP, hereafter) predicted age of onset of sexual intercourse[16] and condomless sex among youth.[17] To our knowledge, however, no studies have assessed for mediating effects between PP and sexual risk behaviors among young people.

Social Cognitive Theory specifies that one of the mechanisms by which PP affects behavior is through "outcome expectations," which is defined as the social approval of behaviors as well as the self-satisfaction or self-worth one derives from performing a behavior.[8] Those with higher PP are more likely to rely on social approval as well as behaviors that increase self-worth at the expense of health promoting behaviors. The need for sexual validation (NSV) is one potential mediator that conceptually corresponds with outcome expectations and one that may mediate the relationship between PP and sexual risk behaviors. NSV is defined as the sense of validation individuals feel about themselves (perceived self-validation) as well as the

validation they perceive from peers (perceived peer validation) with regards to sex and sexual relationships. Self-validation corresponds with the self-satisfaction/self-worth component of outcome expectations and peer validation corresponds with the social approval component.

Learning how to balance and digest self- and peer validation regarding sex and sexual relationships may be a highly relevant task for youth. Youth are faced with the developmental task of positive identity formation, which primarily involves developing a strong sense of self (self-identity) as well as a sense of self in relation to others (relational identity).[21] A number of factors influence the development of self- and relational identity, such as individual psychosocial characteristics (e.g., self-esteem) as well as environmental characteristics (e.g., strength of relationship with parents, school-connectedness, and peer relationships).[22] Perceived powerlessness may be another factor that influences both identity development and the need for sexual validation among youth.

Feeling powerless is often a subjective evaluation of one's objective lack of power and control.[7,23] Objective powerlessness, in turn, is influenced by an individual's social position, including socioeconomic status (SES) and gender.[13,24-28] Women generally feel more powerless than men do,[29,30] and similarly, lower SES individuals feel more powerless than higher SES individuals.[24,26,31] Therefore, the psychosocial effects of PP may vary by gender and SES, which in turn may influence the emerging gender and SES differences in sexual risk behavior. Determining whether social positions differentially impact this relationship may ultimately help us better understand and address the SES and gender disparities in STIs.

The primary objective of this study is to determine whether the relationship between PP and various sexual risk behaviors (i.e., multiple partners, inconsistent condom use, condomless sex, and concurrency) is mediated by NSV among a demographically diverse sample of youth in Baltimore, MD. We hypothesized that individuals who feel powerless seek to reclaim their power via validation through sex and sexual relationships (i.e., NSV). In turn, those who have higher NSV seek such validation at the expense of preventive behaviors, and as a result, exhibit riskier sexual practices. In short, we hypothesized that the relationship between PP and sexual risk behavior would be partially or fully mediated by NSV.

Our secondary objective is to assess whether SES and gender moderates the pathway from PP to NSV to sexual risk behavior. We hypothesized that the effect of PP to NSV to sexual risk behavior would be stronger among low SES and among female compared to high SES and male individuals, respectively. There are robust theoretical reasons for testing a moderation hypothesis by race in addition to gender and SES. However, results of earlier measurement invariance testing of PP and NSV scales indicated that measurement models were different for white versus black youth (See Chapter 3 of thesis). Consequently, we a-priori stratified the study sample by race and could not make direct comparisons across race, impeding our ability to test a moderation hypothesis.

5.3. Methods

5.3.1. Participants and Procedures

The current analysis stems from a longitudinal household study of youth, aged 16-25 years old. Data were collected from February 2011 through May 2013 and yielded

a baseline sample of 350 participants and a six-month follow-up sample of 257. Details of study methods have been described elsewhere.[32] Briefly, investigators employed a stratified sampling design by census block groups (CBGs) to allow for oversampling in areas with high concentrations of the target population. A probability-based sample of residential mailing addresses were then generated within each CBG. Participants were eligible if they were black or white, English speaking, sexually active, between the ages of 16 and 25 years old, and residing in Baltimore City. Parental/guardian informed consent and adolescent informed assent were obtained for individuals younger than 18 years old. Informed consent was obtained for individuals 18 years or older. Of the 12,000 households that were sent letters, 10,509 were successfully contacted. Of those who were contacted, 281 household were eligible, and 237 agreed to participate (84%). The study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Consented and enrolled participants were administered an audio computer-assisted self-interview (A-CASI) in a private setting. The A-CASI survey captured information on demographics, PP, various psychosocial variables (e.g., social support, gender attitudes, and NSV), and individual- and partner-related sexual risk behaviors (e.g., condomless sex, concurrency, and number of partners).

5.3.2. *Measures*

Perceived Powerlessness (PP). The 9-item PP scale was previously developed to reflect the Baltimore context, which is characterized by lack of educational and economic opportunities as well as high rates of poverty and violence.[33-35] Previous scale validation indicated that the PP scale was a valid and reliable measure (α=0.83) (See

Chapter 3 of thesis). The results of exploratory analysis exhibited a three factor solution on the first order (i.e., future, present, and money) and a one factor solution on the second order; the same factor structure was specified for the measurement model in the current analysis. Appendix 5.1. shows the three sub-domains and corresponding items in the PP scale. In addition, results of previous measurement invariance testing indicated that the scale was invariant by gender and SES, but not race. The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). All items were reverse coded so that higher scores indicated greater levels of PP.

Need for Sexual Validation (NSV). NSV was measured by an 11-item scale and aimed to capture the importance that individuals place on having sex and sexual relationships through the validation they seek from themselves as well as from their peers. An example of an item from the NSV scale was "the more people I am having sex with, the better I feel about myself." Previous scale validation showed that the scale was valid and reliable (α=0.90) (Appendix 5.2.). Exploratory factor analysis indicated a one-factor structure and was specified as such in the current analysis. Similar to the PP scale, earlier measurement invariance testing showed invariance across gender and SES, but not race. The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). All items were reverse coded so that higher scores indicated greater NSV.

Sexual Risk Behaviors. We looked at a total of four recent (past six months) sexual risk behaviors: multiple partners (>1 vs. ≤1), inconsistent condom use (always vs. >always during vaginal or anal sex), condomless sex at last sex (yes vs. no condom

vaginal or anal sex), and concurrency (yes vs. no). Concurrency was measured by asking participants whether they had vaginal or anal sex with anyone other than the partner(s) they had listed while they were seeing that partner.

Covariates. For descriptive purposes only, we looked at the following demographic and psychosocial characteristics of participants: age (continuous), gender (male vs. female), race (black vs. white), SES (low vs. high), sexual orientation (heterosexual vs. non-heterosexual, including gay or bi-sexual), depressive symptoms (CESD: <16 (below clinical threshold) vs. ≥16 (mild to severe)),[36] ever arrested (yes vs. no), and grew up without a dad (yes vs. no). For SES, we employed a subjective construct (i.e., perceived SES). Perceived SES was measured using an image of a ladder with ten rungs (values ranging from 1 to 10 with 1 indicating higher perceived SES). Participants were asked to place themselves based on where they think they stand in society in terms of money, education, or jobs.[37,38] The scores were then dichotomized (low SES (≥6) vs. high SES (< 6)).

5.3.3. Analysis

Differences in key demographic and psychosocial variables by race were examined via two-tailed chi-squared tests for binary variables and t-tests for continuous variables with significance set at $\alpha<0.05$. To ensure comparability of baseline versus follow-up samples, we compared key demographic factors, PP and NSV scores, and sexual risk behaviors over time similarly using chi-squared and t-tests. We did not find any statistically significant differences in these characteristics between the two time points (results not shown).

We first employed structural equation modeling (SEM) to test whether NSV (at baseline) mediated the relationship between PP at baseline and sexual risk behaviors at follow-up (i.e., multiple partners, inconsistent condom use, condomless sex at last sex, and concurrency). Based on the literature, we controlling for theoretically relevant variables including age, gender, and SES. Results of normality testing (results not shown) indicated that the latent variable and their indicators were not multivariate normal. Accordingly, a weighted least squares mean and variance (WLSMV) estimator was used.[39] Adequacy of model fit was assessed using the root-mean-square error of approximation (RMSEA), with values <0.10 as indicating good fit.[40] In addition, the Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) values >0.95 were used to denote good fit.[41] Nested models were compared using a robust chi-square model difference test using the Mplus DIFFTEST function. Bivariate analyses were performed using STATA Version 13,[42] and SEM was performed using MPlus Version 7.[39]

Mediation assessment was guided by Baron and Kenny and involved the comparison of three models: non-mediated model, partially-mediated model, and fully-mediated model (see Figure 5.1.).[43] For each outcome, the non-mediated model assessed the direct effect of PP on outcome, excluding the mediator (i.e., NSV). It must be noted that a statistically significant relationship between PP and the outcome is not required in order to proceed to the next step.[44] The second and partially mediated model included NSV, resulting in three direct effects: PP on outcome, PP on NSV, and NSV on outcome. The fully mediated model excluded the direct effect of the PP on outcome and only included the direct effects of PP on NSV and NSV on outcome.

We can conclude that there is full mediation when the following conditions hold: First, the direct effects (PP on NSV and NSV on outcome) of the partially mediated model is statistically significant *and* the direct effect of PP on outcome is close to zero and not significant; Second, the *p*-value for the chi-square difference testing comparing the partially mediated to the fully mediated model is not significant; Third, the indirect effect of the PP on outcome via NSV is significant in the fully mediated model.[45] Indirect effects were obtained using the model indirect command in Mplus. Bootstrap standard errors (S.E.) and confidence intervals were also obtained via MPlus; 1,000 bootstrap samples were requested.[39]

To test our moderated mediation hypotheses by gender and SES, we used multi-group SEM. We first fit an unconstrained model in which path coefficients were allowed to vary across groups and then fit a constrained model in which path coefficients were forced to be equal. A non-significant multi-group chi-square value signified that the smaller, constrained model did not fit the data statistically significantly worse, meaning that we did not find evidence to support moderation. Conversely, a significant multi-group chi-square value signified that the path coefficients were in fact different across groups, meaning that we found evidence to support moderation. Moderation was only assessed for models in which there was evidence of statistically significant mediation. For the SES-moderated mediation models, we specified only age and gender as control variables since we could not specify SES as a control variable within the multi-group SEM framework. Similarly for the gender-moderated mediation models, we specified only age and SES as control variables and excluded gender.

5.4. Results

The mean age of our total sample (N=350) at baseline was 21 years old and the majority of the sample identified as black (65%), female (62%), and heterosexual (79%) (Table 5.1.). Over half (58%) of the sample perceived their SES as low. Thirty-eight percent of the sample reported depressive symptoms, 21% had ever been arrested, and 70% indicated growing up without a father figure. At the bivariate level, there were racial differences in age (white youth more likely to be older; $p<0.001$) and growing up without a father figure (white youth more likely to grow up without a father; $p=0.041$). There were also racial differences in NSV scores (white youth more likely to have increased NSV; $p=0.001$) and sexual risk behaviors (white youth more likely to report inconsistent condom use; $p=0.002$) and condomless sex ($p=0.013$), but less likely to report concurrent relationships ($p=0.037$).

[Table 5.1. here]

Among black youth, statistically significant mediation only occurred with condomless sex at last sex (Table 5.2.). In the partially mediated model, the direct effect of PP on outcome was not statistically significant (β=-0.137; $p=0.401$), the direct effect of PP on NSV was significant (β=0.579; $p<0.001$), and the direct effect of NSV on condomeless sex was significant (β=0.425; $p=0.020$). The indirect effect (from PP to NSV to condomless sex) was marginally significant (β=0.246; $p=0.052$). The fully mediated model produced similar results; the chi-square difference test indicated that the fully mediated model was not statistically significantly worse ($p=0.968$), indicating evidence of full mediation. In the fully mediated model, higher levels of PP indirectly predicted greater propensity of condomless sex through greater levels of NSV, adjusting

for age, SES, and gender (β=0.170; p=0.009). Older individuals were at greater propensity of reporting condomless sex (p<0.010) and females showed decreased propensity for NSV, controlling for all other variables (p<0.001). Model fit statistics for the fully mediated model indicated moderate to good fit (RMSEA: 0.057; CFI: 0.950; TLI: 0.943). Figure 5.2. shows the parameter estimates between all observed and latent variables for this outcome among black youth.

[Table 5.1. here]

[Figure 5.2. here]

Among white youth, statistically significant mediation only occurred with concurrency (Table 5.3.). In the partially mediated model, the direct effect of PP on concurrency was close to zero and not statistically significant (β=-0.041; p=0.796), the direct effect of PP on NSV was significant (β=0.282; p=0.001), and the direct effect of NSV on concurrency was significant (β=0.673; p<0.001). The indirect effect (from PP at baseline through NSV to concurrency at follow-up) was also significant (β=0.189; p=0.044). The fully mediated model produced similar results; the chi-square difference test indicated that there was evidence of full mediation (p=0.798). In the fully mediated model, higher levels of PP indirectly predicted greater propensity of concurrency through greater levels of NSV, adjusting for age, SES, and gender (β=0.196; p=0.009). Females showed decreased propensity for NSV, holding all other variables constant (p<0.001). Model fit for the fully mediated model for concurrency among white youth was moderately good (RMSEA: 0.069; CFI: 0.934; TLI: 0.925). Figure 5.3. shows the parameter estimates between all observed and latent variables for this outcome among white youth.

[Table 5.3. here]

[Figure 5.3. here]

There was no evidence of moderated mediation by gender for either black or white youth for any of the sexual risk behaviors. There was evidence of moderated mediation by SES for concurrency among white youth only (chi-square difference test *p*-value=0.022) (Table 5.4.). The indirect effect from PP to NSV to concurrency among low SES white youth was marginally significant (β=0.186; *p*=0.061). The direction of the indirect effect from PP to NSV to concurrency among high SES white youth was reversed but was not significant (β=-0.146; *p*=0.211).

[Table 5.4. here]

5.5. Discussion

The goal of this study was to determine whether NSV mediated the relationship between PP and a range of sexual risk behaviors employing a demographically diverse, longitudinal sample of urban youth. Findings revealed that both PP and NSV influence subsequent sexual risk behaviors, providing support for our application of Social Cognitive Theory. Specifically, NSV fully mediated PP and condomless sex at last sex among black youth and concurrency for white youth. These results suggested that NSV is at least one important mechanism by which PP determines sexual risk behavior, adding to the evidence base from which to develop STI interventions for youth.

The racial patterns in prevalence of condomless sex and concurrency were similar to those founds in other studies.[17,46-48] White youth were more likely to report condomless sex and less likely to report concurrent relationships compared to black youth. However, despite lower overall prevalence of concurrency among white youth,

vulnerable white youth with high PP and high NSV were more likely to report concurrent relationships. Looking at overall patterns in prevalence of a behavior can often mask important trends among vulnerable sub-groups, such as white youth who perceive they have little power. Our results highlight the importance of looking at the nuances occurring within sub-groups, given the heterogeneity in PP and NSV observed within racial groups. We did not find that PP predicted increased condomless sex through NSV among white youth, which suggests that other psychosocial drivers (e.g., substance use[49]) may be more relevant.

Similarly, our results showed that vulnerable black youth with high PP and high NSV were more likely to report condomless sex at last sex despite overall lower prevalence of condomless sex among black compared to white youth. STI intervention efforts may be more resource-effective if they identify and target sub-groups of black youth with high PP and rather than treating black youth as a homogenous population. We did not find evidence to support that PP predicted concurrency via NSV among black youth. Again, this finding may reflect the existence of alternate and more influential drivers of concurrency other than PP and NSV. For example, studies have demonstrated that higher mortality and incarceration rates among black men skew sex ratios, increasing the likelihood of concurrency among black compared to white individuals.[50,51]

Our results also indicated that the mediated relationship between PP and sexual risk behavior may depend on levels of SES among white youth. More precisely, the mediated pathway from PP to NSV to concurrency was marginally significant for low SES white youth and not significant for high SES white youth. The parent study used a

stratified sampling design to ensure an adequate sample size of low SES whites. Other studies have also noted the difficulty in accessing low SES white individuals, which may contribute to this sub-group being an understudied population for sexual risk behaviors and STIs.[52] However, our results indicated that this sub-group showed increased sexual risk and, therefore, should not be overlooked. The relationship between PP and condomless sex at last sex did not depend on levels of SES among black youth. It is possible that psychosocial effects and sexual risk are not evincing themselves in the same ways among low SES black youth compared to low SES white youth. Future qualitative research could help clarify the interactive effects of black race and low SES in influencing sexual risk.

We did not see any moderating effects of gender, which support previous research that also failed to find support for gender moderation in the relationship between PP and sexual risk.[17] It is possible that powerless young women and men are increasingly less different in the ways they arrive at sexual risk, contrary to the common assumption that women are more vulnerable. Thus, different social identities may be more relevant across groups when explaining the mediated relationship between PP and sexual risk behavior.[13,25]

In order to increase feelings of power and control, STI interventions must seek to increase both individual and collective efficacy through empowerment-based approaches, which involves mastering experiences, vicarious experiences (i.e., watching other successfully complete a task or goal) and verbal persuasion (i.e., convinced by someone else that the individual can complete the task).[8] Peer-based interventions, in particular, have been shown to effectively empower participants precisely through these

mechanisms as well as to reduce sexual risk behavior.[53-55] Clinical interventions that foster cognitive emotional regulation (e.g., increasing awareness of one's emotional state) have also been shown to effectively diminish one's sense of powerlessness.[56,57] Additional resources that mitigate the structural conditions that lead to feelings of diminished power should be provided in tandem.

In addition, STI interventions should assist youth in finding alternate sources of validation other than sex and sexual relationships without diminishing the importance of healthy sexual development. For example, promoting individual and community assets through a Positive Youth Development approach by offering young people with academic, economic, and volunteer opportunities has been shown to increase one's self-confidence and self-worth.[53,58] Such interventions would not only reduce NSV but also levels of PP, resulting in empowering processes that mutually reinforce one another. NSV from peers could be reduced by directly targeting the peer norms that promote increased sexual risk behavior (e.g., peer educators)[55] or indirectly by increasing one's self-worth (i.e., increasing the relative strength of self-identity versus relational identity).[21]

Our study was characterized by several limitations. We were not able to assess moderated mediation by race due to results of earlier measurement invariance testing on PP and NSV scales. Future studies should continue to assess potential moderators, including race. The loss to follow-up was moderate at 26.5% (93/350), but a post-hoc analysis comparing key characteristics, as well as predictor and outcomes, indicated no statistically significant differences between those who were lost to follow-up versus those who remained in the study. Lastly, we were not able to account for other

psychosocial variables since they were not measured as part of the original data collection. For example, religion and religiosity has been shown to moderate feelings of powerlessness and health outcomes especially among black and low-income populations,[59] Another potentially important variable would have been violence victimization, which has been linked to both higher levels of PP and sexual risk behaviors.[60,61]

Despite these limitations, this study was the first to determine potential mediating effects in the relationship between generalized PP and a comprehensive range of sexual risk behaviors among a demographically diverse, longitudinal sample of youth. Our study results also provided an important first step in exploring how various social identities differentially impact sexual risk, drawing attention to the vulnerability of overlooked sub-groups such as low SES white youth. Finally, our study results highlighted the need for more targeted and culturally appropriate interventions, which may contribute to reducing overall STI burden as well as demographic disparities in STIs among youth.

5.6. Tables and Figures

Table 5.1. Baseline participant characteristics and recent* sexual risk behaviors by race (N=350)

	Total		**Black youth**		**White youth**		
	n	(%)	N	(%)	N	(%)	*p-value*
Age (Mean, SD)	21.0	(2.6)	20.8	(2.6)	21.5	(2.6)	**0.006**
Gender							
Female	218	(62.3)	148	(64.9)	70	(57.4)	0.166
Male	132	(37.7)	80	(35.1)	52	(42.6)	
SES							
Low	204	(58.1)	135	(60.3)	69	(57.0)	0.559
High	141	(40.9)	89	(39.7)	52	(43.0)	
Sexual orientation							
Heterosexual	259	(78.7)	165	(77.8)	94	(80.3)	0.594
Non-heterosexual	70	(21.3)	47	(22.2)	23	(19.7)	
Depressive symptoms (≥16)*	128	(37.9)	75	(34.3)	53	(44.5)	0.062
Ever arrested	75	(21.4)	54	(23.7)	21	(17.2)	0.160
Grew up without a dad	243	(70.0)	141	(62.4)	102	(84.3)	**<0.001**
Need for Sexual Validation (Mean, SD)	17.8	(7.2)	16.7	(7.1)	19.8	(6.9)	**<0.001**
Perceived Powerlessness (Mean, SD)	12.1	(11.7)	11.3	(11.6)	13.6	(11.8)	0.092
>1 sexual partner**	67	(26.7)	44	(26.0)	23	(28.1)	0.735
Inconsistent condom use**	134	(52.8)	78	(45.9)	56	(66.7)	**0.002**
Condomless sex at last sex**	129	(50.8)	77	(45.3)	52	(61.9)	**0.013**
Concurrency**	38	(15.0)	31	(18.2)	7	(8.3)	**0.037**

*past six months

**assessed at follow-up (N=257)

Table 5.2. Parameter estimates and fit indices of structural equation models assessing mediation for outcome, condomless sex at last sex, among black youth (N =227)*

Outcome: Concurrency	PP → outcome β (p-value)	PP → NSV β (p-value)	NSV → outcome β (p-value)	PP → NSV → outcome β (p-value)	χ2	df	χ2 difference test p-value	RMSEA	CFI	TLI
Non-mediated	0.114 (0.257)	--	--	--	94.263	56	--	0.055	0.976	0.967
Partially mediated	-0.137 (0.401)	0.579 **(<0.001)**	0.425 **(0.020)**	0.246 (0.052)	415.717	238	--	0.058	0.949	0.942
Fully mediated	--	0.578 **(<0.001)**	0.294 **(0.006)**	0.170 **(0.009)**	371.946	239	0.968	0.057	0.950	0.943

*adjusted for age, gender, and SES

Table 5.3. Parameter estimates and fit indices of structural equation models assessing mediation for outcome, concurrency, among white youth (N = 122)*

Outcome: Concurrency	PP → outcome β (p-value)	PP → NSV β (p-value)	NSV → outcome β (p-value)	PP → NSV →outcome β (p-value)	χ^2	df	χ^2 difference test p-value	RMSEA	CFI	TLI
Non-mediated	0.226 (0.083)	--	--	--	94.565	56	--	0.075	0.963	0.951
Partially mediated	0.041 (0.796)	0.282 **(0.001)**	0.673 **(<0.001)**	0.189 **(0.044)**	378.787	238	--	0.070	0.932	0.922
Fully mediated	--	0.283 **(0.001)**	0.692 **(<0.001)**	0.196 **(0.009)**	375.798	239	0.798	0.069	0.934	0.925

*adjusted for age, gender, and SES

Table 5.4. Parameter estimates assessing moderated mediation by SES for outcome, concurrency, among white youth (N=122)

	Low SES		**High SES**		**χ^2 difference test p-value**
	β	*p-value*	β	*p-value*	
PP → NSV	0.300	**0.018**	0.168	0.173	
NSV → Concurrency	0.618	**0.001**	-0.788	**<0.001**	0.022
PP → NSV → Concurrency	0.186	0.061	-0.146	0.211	

Figure 5.1. Illustration of three models used for mediation analysis with outcome number of partners

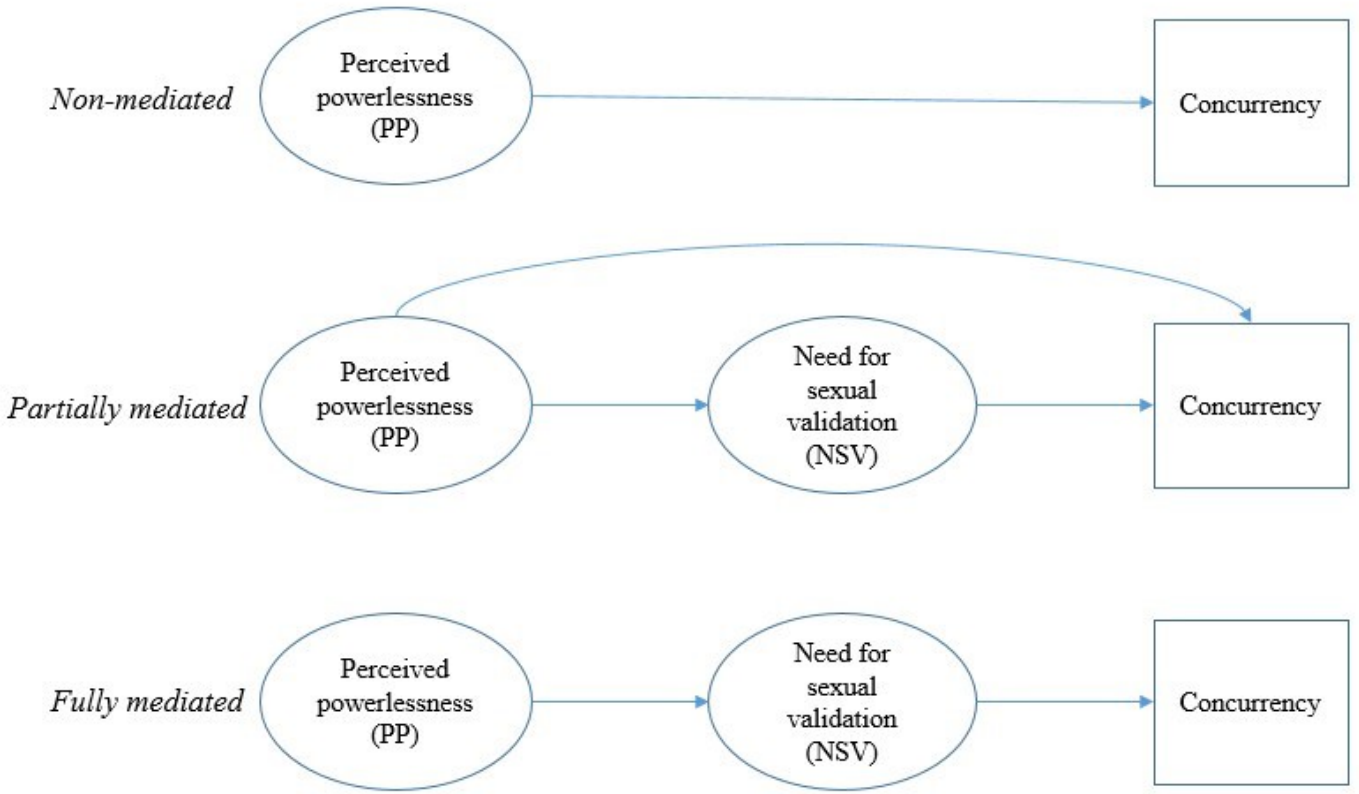


Figure 5.2. Standardized parameter estimates with outcome, condomless sex, among black youth (N=227), adjusted for age, gender, and SES

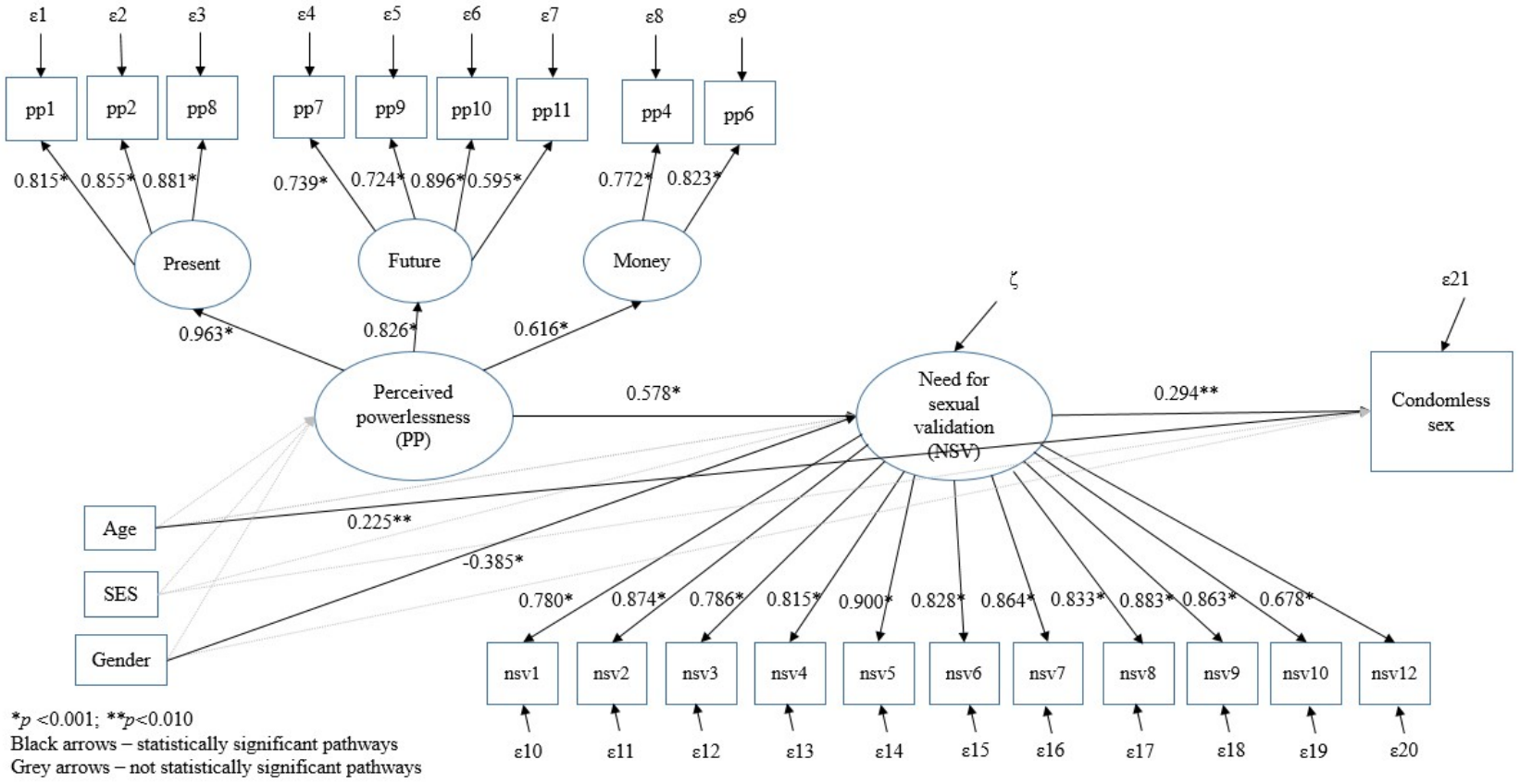
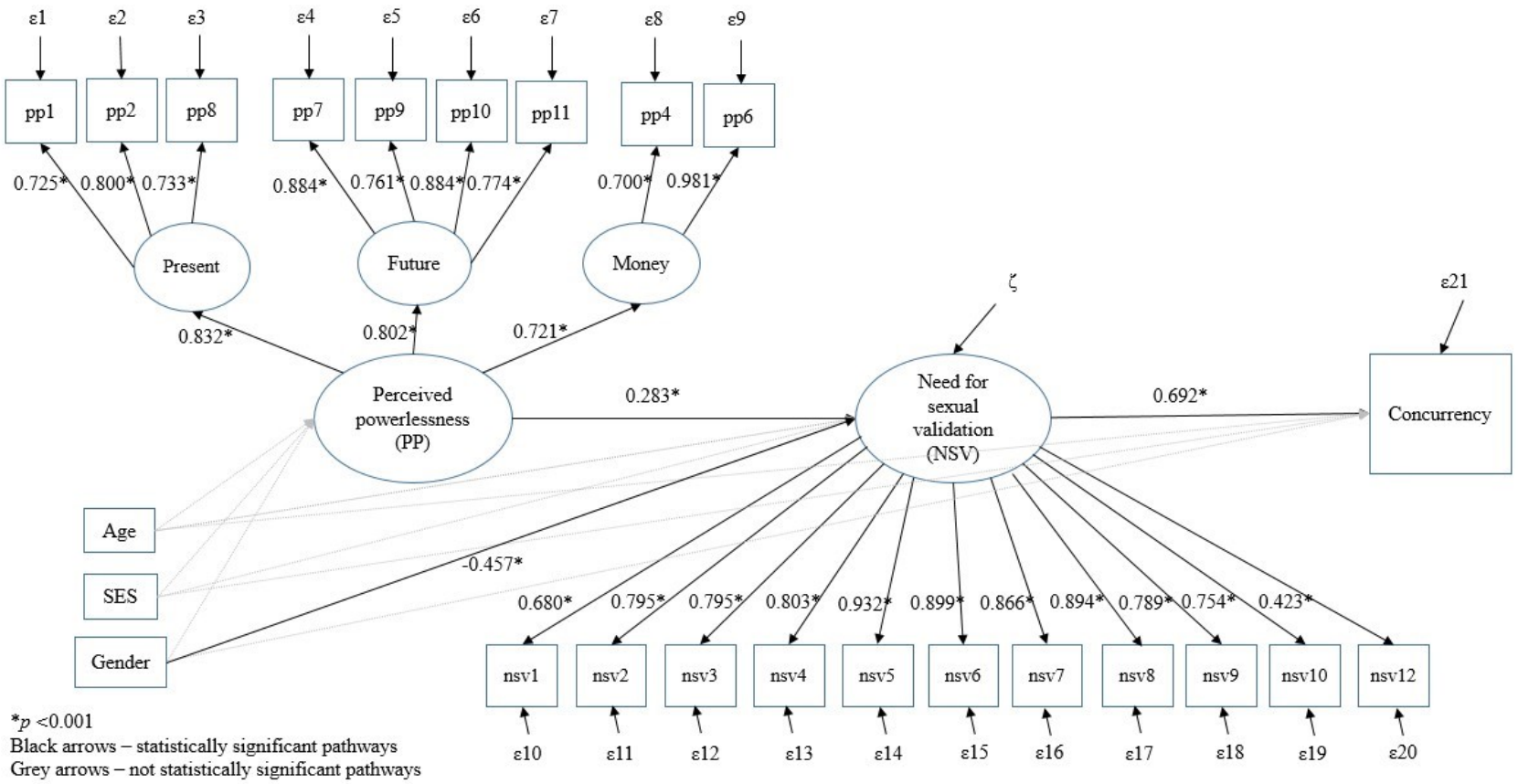


Figure 5.3. Standardized parameter estimates with outcome, concurrency, among white youth (N=122), adjusted for age, gender, and SES



5.7. Appendices

Appendix 5.1. Item wording in 9-item Perceived Powerlessness Scale

Sub-domain 1: Present Perceived Powerlessness
pp1. Sometimes I feel that I am being pushed around in life
pp2. When I have a problem, I do not feel confident I can solve it
pp8. At school or work, I do not always speak up when I have something to say because I do not think anyone will listen to me

Sub-domain 2: Future Perceived Powerlessness
pp7. I do not think that my education has prepared me to achieve a successful career
pp9. I do not think much about voting in the future because politicians are not interesting in helping to improve the situation of people like me
pp10. There is no point in trying to change things for the better because no one cares or wants to help
pp11. Working hard in school or on the job does not guarantee better opportunities later on

Sub-domain 3: Financial Perceived Powerlessness
pp4. I worry about money because jobs for me or my family members are not easy to find or keep
pp6. Saving money is hard to do in my household because we already have a hard time paying the bills

Appendix 5.2. Factorial Validity and Invariance Assessment of the Need for Sexual Validation Scale among Urban Youth

The third aim of this thesis was to examine whether the need for sexual validation mediated the relationship between perceived powerlessness and sexual risk behavior. The need for sexual validation scale was newly developed by the parent study research team and has yet to be validated. We assessed the factorial validity of the need for sexual validation scale and assessed its invariance across race, gender, and SES. Analytic methods were the same as those used in Chapter 3 of this thesis, in which the factorial validity and invariance of the perceived powerless scale were examined.

The need for sexual validation was defined as the sense of validation an individual feels about his or herself (perceived self- validation) as well as the validation an individual perceives from peers (perceived peer validation) with regards to sex and sexual relationships.[62] The original need for sexual validation scale included 12-items. To our knowledge, this scale was the first to specifically measure the importance of sex and sexual relationships. The scale had responses rating on a 4-point Likert scale (1 = strongly agree; 2 = somewhat agree; 3 =somewhat disagree; 4 = strongly disagree). An example of an item from the need for sexual validation scale was "the more people I am having sex with, the better I feel about myself." (Table 5.5.). All items were reverse coded so that higher scores indicated greater need for sexual validation.

The results of the initial principal components analysis (PCA) and scree plot conducted on the baseline sample for the need for sexual validation scale indicated that it has a one-factor structure. Item 11 did not load highly on the factor and exhibited a high uniqueness value. When we looked at the item wording, we could see that unlike other items, it was vague in terms of whether the validation was sought from peers or from

oneself and was therefore dropped from the scale. PCA and exploratory factor analysis (EFA) were re-conducted and the results indicated a one-factor structure; percent variance explained increased from 64% (12-item scale) to 69% (11-item scale). The alpha coefficient for the 11-item scale was 0.90 (Table 4). Results of the final EFA are presented in Table 1.

[Table 5.5. here]

We then conducted a one-factor CFA on baseline and follow-up samples based on these results. The model fit indices of the baseline sample suggested that the model was a good fit to the data: degrees of freedom (d.f.) = 44, chi-square (X^2) = 263.136, RMSEA = 0.120, CFI = 0.955, and TLI = 0.944. Model fit indices for the follow-up sample exhibited a similar fit (results not shown).

Similar to the perceived powerlessness scale, results of invariance testing supported measurement invariance by gender, SES, time point, but not race. *P*-values for chi-square difference testing by gender, SES, and time point were not significant (p = 0.684; p = 0.762; p = 0.423, respectively), indicating measurement invariance. In contrast, results of invariance testing by race indicated that measurement invariance is not supported (p <0.001). Although the model for white youth exhibited a slightly better fit, both models indicated relatively strong fit. Table 5.6. displays the factor loadings and r-square values by race for the need for sexual validation scale and Table 5.7. shows the model fit statistics separately by race. The scale can be validly used to assess the need for sexual validation among urban youth regardless of their gender or SES. Direct comparisons of the construct across race, however, should not be made and future analyses involving the scale should stratify models by race.

[Table 5.6. here]

[Table 5.7. here]

Table 5.5. Results of EFA exploratory factor analysis on the need for sexual validation scale at baseline

Item (overall scale α= 0.90)	Exploratory Factor Analysis	
	loading	uniqueness
Factor 1: need for sexual validation		
nsv1. My friends respect me more when I am in a sexual relationship	0.743	0.448
nsv2. I feel better about myself when I am in a sexual relationship	0.829	0.312
nsv3. My friends encourage me to have sexual relationships	0.806	0.350
nsv4. My friends think something is wrong with me if I am not having sex regularly	0.789	0.378
nsv5. The more people I am having sex with, the better I feel about myself	0.913	0.167
nsv6. Having sex early in the relationship is a good way to keep the other person around	0.884	0.219
nsv7. My friends encourage me to find a sexual partner when we go to a club or bar	0.875	0.234
nsv8. I do not think positively about myself when I am not having sex regularly	0.873	0.238
nsv9. I sometimes feel envious of other people in sexual relationships when I am not in one	0.768	0.411
nsv10. I am a more complete person when I am in a sexual relationship	0.812	0.340
nsv12. Having a boyfriend or girlfriend makes me feel more valuable	0.606	0.633
Deleted item		
nsv11. I feel like there is a lot of pressure to be in a sexual relationship	N/A	N/A

Table 5.6. Standardized factor loadings and r-square values by race for the need for sexual validation scales at baseline

		Factor loadings		R-Square	
	Item	**Black**	**White**	**Black**	**White**
Need for Sexual Validation	nsv1	0.755	0.641	0.569	0.410
	nsv2	0.882	0.821	0.778	0.675
	nsv3	0.830	0.811	0.689	0.658
	nsv4	0.812	0.760	0.659	0.577
	nsv5	0.895	0.949	0.801	0.901
	nsv6	0.849	0.905	0.721	0.820
	nsv7	0.886	0.872	0.784	0.760
	nsv8	0.813	0.876	0.661	0.767
	nsv9	0.842	0.723	0.709	0.522
	nsv10	0.863	0.774	0.745	0.599
	nsv12	0.625	0.506	0.391	0.256

Table 5.7. Model fit statistics by race for need for sexual validation scale at baseline

Need for sexual validation	**Black**	**White**
Degrees of Freedom	44	44
Chi-square	191.603	107.042
RMSEA	0.122	0.109
CFI	0.953	0.968
TLI	0.941	0.960

5.8. References

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6. SYNTHESIS

6.1. Summary of Chapters

Most recent data from the 2015 Youth Risk Behavioral Surveillance indicated that condom use at last sex has increased and that the prevalence of currently sexually active youth has declined in the last few years.[1] Despite declines in these sexual risk behaviors, the STI epidemic continues to be characterized by age, gender, racial, and socioeconomic disparities, with youth having the highest burden of STIs compared to other age groups.[2,3] Systematic reviews have indicated that the majority of STI interventions focus too narrowly on individual-level behaviors without addressing more distal psychosocial correlates of STI risk.[4,5] Generalized perceived powerlessness is a distal psychosocial construct that has been underexplored in relation to sexual risk behaviors and one that was our primary variable of interest. The overall objective of this thesis was to use a valid and reliable measure of perceived powerlessness to predict a range of sexual risk behaviors, as well as to assess mediating and moderating effects in this relationship among youth in Baltimore. A summary of the results from the three manuscripts (Chapters 3, 4, and 5) are presented below, highlighting the iterative ways in which each thesis aim successively built on prior ones.

6.1.1. "Our perceived powerlessness scale had three sub-domains and was invariant across gender and SES."(Aim 1)

Results of exploratory and confirmatory factor analyses indicated that perceived powerlessness was multi-dimensional on the first order and unidimensional on the second order. Specifically, the construct showed three distinct factors on the first order: present (feeling powerless in the present), future (feeling powerless about the future), and money

(feeling powerless about finances). The first two factors (present and future) point to the primacy of time orientation in conceptualizing the construct. The money factor points to the salience of financial insecurity for our population living in an urban context characterized by high rates of poverty, unemployment, and lack of educational opportunities. Results of invariance testing showed that the construct was invariant across gender and SES, but not race. This novel scale is valid and reliable for use in future health behavior and outcome studies among urban youth, but direct comparisons cannot be made across race.

6.1.2. "Perceived powerlessness predicts report of multiple partners, condomless sex at last sex, and inconsistent condom use (Aim 2.1); financial perceived powerlessness may be the underlying driver of this relationship." (Aim 2.2)

Results of multiple logistic regression indicated that youth who feel powerless at baseline are at increased odds of reporting multiple partners (aOR: 2.13, p=0.019), condomless sex at last sex (aOR: 1.70, p=0.049), and inconsistent condom use (aOR: 1.76, p=0.042) at six month follow-up. We sought to determine whether any of the sub-domains of perceived powerlessness (i.e., present, future, and money powerlessness) uniquely predicted these sexual risk behaviors. We found that feeling financially powerless is the main driver of subsequent report of multiple partners (aOR: 1.63, p= 0.012) and inconsistent condom use (aOR: 1.62, p=0.003).

6.1.3. *"The need for sexual validation mediates the relationship between perceived powerlessness and condomless sex at last sex among black youth and concurrency among white youth."(Aim 3.1); "The mediated relationship from perceived powerlessness to the need for sexual validation to concurrency among white youth depends on levels of SES." (Aim 3.2)*

We sought to determine whether the need for sexual validation mediated the relationship between feeling powerless at baseline and reporting sexual risk behaviors at follow-up. Results of structural equation modeling showed that the need for sexual validation fully mediated perceived powerlessness and condomless sex at last sex among black youth (indirect effect: β=0.246; p=0.052) and concurrency among white youth (indirect effect: β=0.189; p=0.044). Black youth who felt powerless were more likely to seek validation through sex and sexual relationships, which in turn led to increased likelihood of condomless sex. White youth who felt powerless were more likely to seek validation through sex and sexual relationships, which in turn led to greater likelihood of reporting concurrency.

Results of multi-group structural equation modeling indicated that the relationship between perceived powerlessness to the need for sexual validation to concurrency among white youth depended on levels of SES (chi-square difference test p-value=0.022). When we compared low vs. high SES white youth, the mediation pathway was no longer significant among high SES white youth, suggesting that the original mediated pathway (without moderated effects) was being driven by low SES white youth.

6.2. Conclusions

The results of this thesis provide evidence for the significant role that generalized perceived powerlessness plays in influencing a range of sexual risk behaviors among a demographically diverse, longitudinal sample of urban youth. Despite being distal and generalized without reference to specific health behavior, feeling powerless adversely affected young people's sexual health. Further, our results supported our hypothesis that generalized perceived powerlessness drives sexual risk through the need for sexual validation, substantiating our application of Social Cognitive Theory as a guiding framework.

6.2.1. Limitations

Our study sample was characterized by moderate loss to follow-up (26.5%). We conducted a post-hoc analysis comparing demographic characteristics, independent variables, and dependent variables, which indicated no statistically significant differences between those who were lost to follow-up versus those who remained in the study. Related, our effective sample size (N=257 at follow-up) limited additional analyses and may have affected our power to detect significant differences for some of the sexual risk behaviors. For example, in Chapter 4, perceived powerlessness predicted all sexual risk behaviors with the exception of concurrency. There were 38 youth who reported concurrency at follow-up (15%) compared to other sexual risk behaviors whose prevalence ranged from 27% to 53%. In addition, we were not able to formulate a hypothesis regarding moderation by race in Chapter 5 due to earlier invariance testing indicating that measurement models for perceived powerlessness and need for sexual validation scales were different by race.

There were additional limitations stemming from the use of secondary data. In Chapter 2, we were not able to revise the item wording of the perceived powerlessness scale. For example, all items in the scale were negatively worded, but an ideal scale would have consisted of a balanced number of positively and negatively worded items. Results of the exploratory and confirmatory factor analyses drew attention to the significant role that temporal orientation plays in the conceptualization of perceived powerlessness, yet none of the items referenced feeling powerless about the past. Future scales should consider inclusion of items about past powerlessness in order to improve content validity.[6] In Chapters 4 and 5, we were not able to account for a variety of potentially relevant covariates in our analyses since they were not measured as part of original data collection. Inclusion of non-individual-level (e.g., neighborhood-level poverty) or other psychosocial variables such as violence victimization or religiosity would have strengthened our analyses.[7-9]

Lastly, our results should not be generalized to youth living in non-urban areas or urban areas with different structural conditions and drastically different demographic compositions.

6.2.2. Strengths

Despite these limitations, this thesis had several strengths. Through the use of a demographically diverse dataset, we were able to assess for measurement invariance across key demographic factors in Chapter 3, including race, gender, and SES. Ensuring that a measure is invariant allows for its valid use across those groups. Conversely, findings of non-invariance appropriately prevent its use in demographically diverse samples since the underlying latent construct may be measuring something different for

those groups. In Chapter 5, we were able to assess moderation by gender and SES, allowing for a nuanced understanding of how perceived powerlessness influences sexual risk through group-specific mechanisms and identifying sub-groups (e.g., low SES white youth) who are often overlooked. Use of longitudinal data, especially in assessment of mediating effects, enabled us to draw sounder temporal conclusions compared to use of cross-sectional data.

Further, we used a variety of appropriate and advanced methods that sequentially built on one another. First, we established the validity and reliability of a new construct through use of exploratory and confirmatory factor analyses. We capitalized on both baseline and follow-up datasets to strengthen the interpretation of our conclusions. We then utilized the sub-domains that were ascertained in Chapter 3 to test for their unique contribution in predicting sexual risk. Results of the Chapter 4 provided in an important first step to establishing the relationship between perceived powerlessness and various sexual risk behaviors prior to assessing mediation in Chapter 5. Chapter 5 incorporated measurement models and results of invariance testing from Chapter 3. The use of SEM in Chapter 5 treated the psychosocial variables (i.e., perceived powerlessness and need for sexual validation) as latent, thereby accounting for their measurement error.[10] SEM also precluded the need for sequentially testing for mediation since multiple equations could be considered simultaneously, unlike other statistical methods such as multiple regression.[10] Additionally, we treated and analyzed the indicators as categorical, which many studies often do not do, despite having employed ordinal items that do not have a multivariate normal distribution.

Most importantly, the studies in this thesis sought to fill an important gap in the literature. Chapter 3 assessed dimensionality of the perceived powerlessness scale, which had not been firmly established in the literature. Chapter 3 also provided evidence for the validity and reliability of a novel perceived powerlessness scale that included both generalized items and items referencing structural domains that are particularly relevant to disadvantaged urban populations. Chapter 4 allowed us to longitudinally establish the relationship between generalized perceived powerlessness and a range of sexual risk behaviors among youth, as well as the unique contribution of the financial sub-domain in predicting sexual risk. Lastly, Chapter 5 was the first to assess potential mediating and moderating effects in the relationship between generalized perceived powerlessness and a range of sexual risk behaviors.

6.2.3. Public health impact and future directions

Future studies should continue the work of validating the perceived powerlessness scale among other populations and with larger sample sizes that allow for more complex analyses. Power is an especially broad concept and its refinement through psychometric testing can allow for the construct's valid and reliable use. Qualitative research can play a critical role in uncovering how power is conceptualized differently within and across groups (e.g., black vs. white youth) as well as in generating hypotheses around other possible mediators that may link perceived powerlessness and sexual risk behavior. Lastly, future studies should assess how perceived powerlessness, need for sexual validation, and sexual risk behaviors ultimately influence STIs. Specifically, studies could assess the pathway from perceived powerlessness to need for sexual validation to sexual risk behaviors to STIs as well as the pathway excluding sexual risk behaviors to

increase our understanding of the independent effect of these factors in driving the STI epidemic among youth.

Many STI interventions currently focus on proximal and individual-level factors. Behavior-specific perceived powerlessness is often targeted, while the more generalized, distal construct is overlooked. STI interventions should continue to provide youth with concrete skills such as condom negotiation and partner communication, which are ways of targeting behavior-specific powerlessness. However, results of our study point to the utility of also addressing powerlessness in a more generalized context that goes beyond the sexual or relationship context, which may include goal setting and decision-making skills.[5] Specific interventions to increase perceived power may include empowerment-based approaches that involve mastering experienced (repeated success), vicarious experiences (watching others' success), and verbal persuasion (positive reinforcement).[11] Recognizing that perceived powerlessness is an individual-level factor, we also advocate for STI interventions to address the structural conditions that determine how individuals feel about control and power in their lives.

In addition, STI interventions should aim to diminish the need for sexual validation by providing youth with non-sexual sources of validation through increased opportunities for employment, academic growth, and extracurricular activities. Positive Youth Development approaches that engage youth on multiple levels (e.g., school, community, and family), strengthen assets, and involve youth as equal partners could be particularly useful for simultaneously diminishing perceived powerlessness and the need for sexual validation.[12,13] It is our hope that empowering youth will set them on a

trajectory of positive sexual health outcomes as well as of holistic development to adulthood.

6.3. References

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CURRICULUM VITAE

Sahnah Lim, PhD, MPH, MIA

Tel. 917-214-9070 | Email. slim28@jhu.edu

42-05 147th Street Flushing, NY 11355

SUMMARY

- Six years of experience conducing public health and social science research and evaluation, specializing in both qualitative and quantitative methods, with particular strengths in survey research methods, community-based participatory research, and latent variable methods (exploratory and confirmatory factor analyses, structural equation modeling, and latent class regression).
- Extensive research and program implementation knowledge on sexual and reproductive health, youth development, and gender-based violence, especially among hard-to-reach, marginalized populations both domestically and internationally.
- Diverse international experience conducting research in low resource settings (regional focus on West Africa and Latin America) and professionally proficient in French, Spanish, and Korean.
- Proficient in Stata, MPlus, Atlasti, Endnote, and Microsoft Office.

EDUCATION

Oct. 2016 JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

Baltimore, MD

Department of Population, Family, & Reproductive Health

Doctor of Philosophy (PhD)

Dec. 2010 COLUMBIA UNIVERSITY New York, NY

School of International & Public Affairs

Master of International Affairs (MIA)

Mailman School of Public Health

Master of Public Health (MPH)

Aug. 2006 UNIVERSITY OF WASHINGTON Seattle, WA

Bachelor of Arts (BA) in International Relations

Bachelor of Arts (BA) in Public Health

RESEARCH EXPERIENCE

May 2016 - current **DEPARTMENT OF HEALTH, BEHAVIOR & SOCIETY – Johns Hopkins** Baltimore, MD

Research Assistant

- Qualitative and quantitative data collection with street-based sex workers, injection drug users, and Baltimore City Police Department.
- Instrument development, data analysis, and manuscript writing.

May 2016- June 2016 **PROMUNDO** Washington, D.C.

Consultant – Niamey, Niger (May, 2016)

- Trained a team of local survey enumerators on gender inequality, gender-based violence, contraception, and survey research methods.
- Developed/piloted research instruments and monitored data collection for evaluation of a family planning intervention among married adolescent girls.

Consultant – Technical advisor (June, 2016)

- Provided Promundo team with technical assistance on psychometric testing on the G.E.M.S. scale implemented in Egypt and Morocco.

Sept. 2014- May 2016 **SCHOOL OF MEDICINE - Johns Hopkins** Baltimore, MD

Data Collection Supervisor and Research Assistant

- Supervised survey data collection and trained local data collectors in the Dominican Republic and Ivory Coast.
- Capacity building, project coordination, data collection, and data analysis on gender-based violence among stateless populations in the Dominican Republic and Ivory Coast.

Dec. 2013- May 2016 **DEPARTMENT OF EPIDEMIOLOGY– Johns Hopkins** Baltimore, MD

Research Assistant

- Conducted qualitative and quantitative data collection with exotic dancers.
- Performed data management, data analysis, and manuscript writing.

Sept. 2013- Aug. 2014 **CENTER FOR PUBLIC HEALTH & HUMAN RIGHTS Johns Hopkins** Baltimore, MD

Research Assistant

- Conducted qualitative and quantitative data analysis on health issues among sex workers, men who have with men, and persons who inject drugs in West Africa.

Mar. 2013- **RESEARCH ALLIANCE FOR NEW YORK CITY (NYC)**

Aug. 2013 **SCHOOLS - NYU** New York**,** NY

Survey Manager & Research Analyst

- Recruited, trained, and supervised 13 survey administrators.
- Tracked, monitored, and implemented city-wide survey administration.
- Developed surveys, conducted data analysis, and disseminated study results for a project evaluating a college readiness program for NYC public school students.
- Conducted in-depth interviews and focus groups with school administrators and teachers.

Oct. 2010- **COLUMBIA UNIVERSITY MEDICAL CENTER** New York, NY

June 2011 Department of Obstetrics & Gynecology/ Division of Family Planning

Research Assistant

- Conducted a mixed-method evaluation of medical resident abortion training at NYC public hospitals; responsibilities included conducting interviews, data coding, data analysis, and writing.

May 2010- **ACCIÓN CALLEJERA** Santiago, Dominican Republic

Aug. 2010 *Research Fellow*

- Developed and administered a survey to assess reproductive health needs of street youth.
- Developed a program plan based on needs assessment and facilitated sex education workshops.

PUBLIC HEALTH EXPERIENCE

May 2011- **SANCTUARY FOR FAMILIES,** Anti-Trafficking Initiative

Aug. 2012 New York, NY

Project Assistant and Case Manager

- Provided case management to victims of trafficking, sex workers, and their family members whose primary languages are Korean, Spanish, or French.
- Conducted outreach and training.
- Supervised full-time staff, interns, and volunteers.
- Conducted workshops and support groups for sex workers and trafficking victims.

Aug. 2007- **PLANNED PARENTHOOD OF NYC, INC.,** Education Department

Aug. 2008 New York, NY

Sex Education Program Coordinator

- Coordinated all school- and community-based youth programs in NYC.
- Provided trainings for school-aged youth, youth peer educators, and adult professionals.
- Developed sex education curricula and education material.
- Trained and supervised four full-time sexuality educators.

Sept. 2006- **KOREAN COMMUNITY SERVICES,** Public Health Department

July 2007 New York, NY

Community Health Educator

- Provided case management, education, and enrollment services to

Medicaid and Medicare recipients.

TEACHING EXPERIENCE

Oct. 2015- **DEPARTMENT OF EPIDEMIOLOGY – Johns Hopkins**

Dec. 2015 Baltimore, MD

Teaching Assistant for Drs. Susan Sherman & Andrea Wirtz

- Course title: Health Survey Research Methods; 53 students
- Developed curricula, led group discussions, coordinated logistics, and graded assignments.

Aug. 2015- **DEPARTMENT OF BIOSTATISTICS – Johns Hopkins**

Dec. 2015 Baltimore, MD

Teaching Assistant for Drs. Qian-Li Xue and Jeannie Leoutsakos

- Course title: Statistics for Psychosocial Research; 66 students
- Led lab sessions, held office hours, and graded assignments.

Jun. 2015- **DEPARTMENT OF EPIDEMIOLOGY – Johns Hopkins**

Jun. 2015 Baltimore, MD

Teaching Assistant for Dr. Susan Sherman

- Course title: Health Survey Research Methods – Summer Institute; 12 students
- Developed curricula, led group discussions, coordinated logistics, and graded assignments.

Oct. 2014- **DEPARTMENT OF EPIDEMIOLOGY – Johns Hopkins**

Dec. 2014 Baltimore, MD

Teaching Assistant for Dr. Susan Sherman

- Course title: Health Survey Research Methods; 45 students
- Developed curricula, led group discussions, coordinated logistics, and graded assignments.

PEER-REVIEWED PUBLICATIONS

Brantley, M.R., D. Kerrigan, D. German, **S. Lim,** S.G. Sherman. "Identifying patterns of social and economic hardship among structurally vulnerable women: a latent class analysis of HIV/STI risk." Accepted, *AIDS & Behavior*

Lim, S., S. Peitzmeier, C. Cange, E. Papworth, M. LeBreton, U. Tamoufe, A. Kamla, S. Billong, P. Fokam, I. Njindam, M.R. Decker, S.G. Sherman, and S. Baral. "Violence against female sex workers in Cameroon: Accounts of violence, harm reduction, and potential solutions." *Journal of Acquired Immunodeficiency Syndromes* 68.2 (Mar. 2015): S241-47.

Guiahi, M., **S. Lim**, C. Westover, M. Gold, and C. Westhoff. "Enablers of and Barriers to Abortion Training." *Journal of Graduate Medical Education* 5.2 (Jun. 2013): 238-243.

Guiahi, M., C. Westover, **S. Lim**, and C. Westhoff. "The New York City Mayoral Abortion Training Initiative at Public Hospitals." *Contraception* 86 (2012): 577-82.

MANUSCRIPTS UNDER REVIEW

Lim, S., J. Nail, M.R. Brantley, K. Footer, W. Davis, and S.G. Sherman. "Psychosocial characteristics and sexual risk behaviors among female exotic dancers who have sex with women in Baltimore."

Decker, M.R., J. Nail, **S. Lim,** K. Footer, W. Davis, and S.G. Sherman. "Client and partner violence among exotic dancers and intentions for violence-related help-seeking."

Footer, K., **S. Lim,** M.R. Brantley, S.G. Sherman. "Following the dance: Dancers' experience of risk overtime in the exotic dance club – implications for structural interventions to address women's health in Baltimore City, USA."

MANUSCRIPTS IN PREPARATION

Flath, N., W. Davis, M.R. Brantley, **S. Lim**, S.G. Sherman. "Healthcare service utilization and self-identified needs among new female exotic dancers in Baltimore, MD: a population of low-income women lacking employment-based health insurance."

Brantley, M.R., D. Kerrigan, **S. Lim,** J. Jennings, S.G. Sherman. "Trajectories of structural vulnerability associated with sexual risk behavior and drug use among new female exotic dancers."

Brantley, M.R., K. Footer, **S. Lim,** D. Kerrigan, S.G. Sherman. "Experiences of structural vulnerability among exotic dancers in Baltimore, Maryland: co-occurring social and economic antecedents of HIV/STI risk."

ABSTRACTS

Wirtz, A., **S. Lim**, B. Wooding, E. Clouse, A. Petrozziello and A. Vu. *Poster Presentation.* **"**Assessing gender-based violence among Stateless persons in the Dominican Republic." Sexual Violence Research Initiative Forum, September 14th-17th, 2015 (Stellenbosch, South Africa).

Nail, J., **S. Lim,** M. Reilly, C. Zelaya, W. Davis, and S.G. Sherman. *Oral Presentation.* "Sex worker status and STI testing are associated with PTSD symptoms in female exotic dancers." *8th Annual Johns Hopkins Women's Health Research Symposium*, May 18th, 2015 (Baltimore, MD).

Cange, C., S. Baral, E. Papworth, K. Saylors, **S. Lim**, M. LeBreton, and U.Tamoufe. *Oral Presentation.* "Effect of Stigma, Discrimination and Alienation on the HIV Treatment Cascade for Cameroonian MSM." *142nd APA Annual Meeting and Exposition*, Nov 15 – 19, 2014 (New Orleans, LA).

Gross, S., A. Zucker, E. Biehl, **S. Lim**, B. Marshall, M. Augustyn, D.M. Paige, and K.N. Mmari. "Does selection of foods in the school cafeteria by 6-8 year olds translate into consumption? Results of a cafeteria observation study." *142nd APA Annual Meeting and Exposition*, Nov 15 – 19, 2014 (NewOrleans, LA).

INVITED SEMINARS/ PRESENTATIONS

Concentrated epidemics among sex workers and men who have sex with men in west and central Africa: Using modeling, structural changes, and harm reduction to address the epidemic. *Webinar hosted by USAID West Africa.* Futures Group (Washington, DC). May 2015.

TRAINING GRANTS

Sept. 2015 – Aug. 2016 NATIONAL INSTITUTES OF HEALTH (NIAID T32 AI050056-1)

ACADEMIC HONORS & AWARDS

- Caroline Cochran Scholarship Fund in Population & Reproductive Health – Johns Hopkins Bloomberg School of Public Health [2016-2017]
- Cheryl Alexander Memorial Student Scholarship – Johns Hopkins Bloomberg School of Public Health [2015-2016]
- Department Tuition Awardee – Department of Population, Family, and Reproductive Health (Johns Hopkins Bloomberg School of Public Health) [2013-2018]
- Public Health Practicum Award – Mailman School of Public Health (Columbia University) [2010]
- Graduate Internship Travel Grant – School of International and Public Affairs (Columbia University) [2010]
- Departmental Research Assistantship in the International Organization Specialization – School of International and Public Affairs (Columbia University) [2010]
- Public Health Fellowship – Council of Women World Leaders [2009]
- Public Health Fellowship – International Programs and Exchange (University of Washington) [2006]
- Leslianne Shedd Memorial Internship Fund – University of Washington [2005]